

**POPULATION AND HUMAN DEVELOPMENT-
MEETING SOME CRITICAL NEEDS IN THE NEW
CENTURY**



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**PLANNING COMMISSION
GOVERNMENT OF INDIA
JULY 2000**

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**Papers commissioned by
Health, Nutrition & Family Welfare Division.**



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July 12, 2000

PREFACE

Human Development and improvement in quality of life are the ultimate objectives of all planning. Living in a resource poor country with high population density, planners in India recognized that population stabilization is an essential pre-requisite for sustainable development and improvement in quality of life. India became the first country in the World to formulate and implement National Family Planning Programme in 1952. During the last five decades, there has been a steep decline in mortality and relatively less sustained decline in fertility.

There has been a paradigm shift in the Family Welfare Programme in the last decade and the programme is now gearing up to meet all the health needs for the family to enable them to achieve their reproductive goals. The 9th Plan period may be the beginning of the major acceleration in the pace of demographic transition and improvement in health status as the country is trying to meet all the unmet needs of the growing reproductive age group population. Achievement of the substantial reduction in under nutrition both micro and macronutrients is yet another achievable objective in the new century. Education especially women's education is a critical determinant of not only her well being but also well being and quality of life of her family. The task of providing school education is therefore of paramount importance.

At the request of Planning Commission, four eminent experts have contributed brilliant articles on Population, Food Security, Nutrition Security and School Education in the New Century. It gives me immense pleasure to bring out this publication in the Report Reprint Series of the Planning Commission.

We are indebted to the Deputy Chairman of the Planning Commission Shri K.C. Pant who is also the Vice Chairman of the National Population Commission for his guidance and support at all times.

(K. Venkatasubramanian)
Member (Health)

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POPULATION IN THE NEW MILLENNIUM - LEGACY AND THE CHALLENGE

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Paper prepared at the request of Health, Nutrition & Family Welfare Division of Planning Commission. Views expressed in the paper are the views of the author and not views of the Planning Commission

The census conducted in India at the beginning of the twentieth century, in 1901, had put the population of the country as 238.4 million and the census in the middle of the century, in 1951, put the figure at 361.1 million. According to projections by the Registrar General, made in 1996, the population was expected to cross the billion mark on 11th May this year and stand at 1012.4 million by 2001. Thus the population of the country, within the present boundaries, has increased by 774 million in the 20th century, or more than three times the size at the beginning of the century. Out of this increase, only 122.7 million or 16% of the total century's increase occurred in the first 50 years and 651.3 million or 84% in the second half, 1951 to 2001. Table-I provides the extent of increase in the first and second half of the 20th century in different States and Union Territories. In most of the States and Union Territories, the increase in population during the second half of the century accounted for around 85% of the increase during the century. This is attributable to a sharp decline in the death rates in the post independence period not accompanied by a corresponding decline in the birth rates.

For over a thousand years, until 1920, India's population had been growing very slowly owing to the heavy toll taken by famines, epidemics, and wars. Historians have estimated that the population of the country, even during the Maurya Empire (Fifth Century BC), was between 100 and 110 million and it took almost 25 centuries to double itself, with the average annual rate of increase being a mere 0.03 per cent. Periods of population increase were followed by sharp declines because of wars, famines, floods and epidemics. Even in the early 20th century, the population of the country, within its present geographical boundaries, actually declined between 1911 and 1921, from 252.1 to 251.3 million because of the high mortality inflicted by the influenza pandemic of 1918-19. It is estimated that about 5% of the country's population - some 13 million persons - died in that epidemic. The population began to increase steadily since 1921, largely because of the measures to control epidemics and famines and general sanitation programmes undertaken by the provincial governments under the British rule. Such measures had already proved to be effective in reducing mortality in England. For the first time since the initiation of a systematic population census in 1881, India's population increased by more than 10%, (or by 27.7 million) in a decade, with the 1931 census enumerating a population of 279.0 million (Hutton, 1932). Hence it is customary for demographers to designate the year 1921 as the Big Divide, when mortality levels began to be brought under human control.

Population concern before Independence

Malthusian concerns

In the context of such increase in population since 1921, along with widespread poverty that was prevalent in the country, concerns over the rising population were expressed, even in the twenties, from four quarters : intellectuals, social reformers (especially those interested in improving the status of women), the Congress Party (the leading political party that spearheaded the movement for political independence), and the governments.

Intellectuals in India were mostly drawn from the upper caste elite sections of society and they were exposed to Malthusian theory of population: positive and negative checks on populations growing beyond their means of subsistence. In England and most of the European countries, India was always cited as a basket case of poverty whose population was growing beyond its means of subsistence. Neo-Malthusian Leagues (that approved of birth control, using contraceptive methods unlike Malthusians who considered it as a vice) were set up on patterns similar to such Leagues in England and Europe to warn the people about the dangers of population growth. The first such League to discuss the hazards of high population growth and propagate birth control was set up in Madras City in July 1929. The League published its first public propaganda journal on the need for controlling birth rate called the 'Madras Birth Control Bulletin' in the same year. Similar Neo-Malthusian Leagues were started in subsequent years in other cities, notably in Bombay and Poona. Madras and Bombay seem to be the two Indian cities that were first concerned about the population problem at the intellectual level, which subsequently gained momentum in other cities (Srinivasan, 1995).

The interest and action from social reformers for the control of population growth originated from those activists who were primarily interested in promoting women's health and welfare, especially keen on liberating women from the cycle of childbearing, preventing unwanted births and reducing the hazards to the life and health of pregnant women who were willing to expose themselves to cruel and primitive methods of induced abortion. They were largely influenced by the work of Margaret Sanger in the United States and Edith-Howe Martin from England. This social reform movement was initiated by Prof. R D Karve, who advocated widow-remarriage and practice of artificial methods of family planning to protect women from the hazards of unwanted pregnancies. He started the first contraceptive clinic in Girgaum, Bombay in 1921. He also started a magazine called Samaj-Swasthya (Social Hygiene) in Marathi language in 1927, which was published regularly until his death in 1953. This social-reform movement eventually spread to other parts of the country and was largely responsible for the establishment of Family Planning Association of India in 1949 in Bombay.

At the political level, the Congress Party which was the largest party spearheading India's independence movement under the leadership of reformers within and outside India, was skeptical about adoption of birth control methods. It even opposed them, mainly because of Mahatma Gandhi's strong moral opposition to the use of artificial methods of birth control. Mahatma Gandhi argued that though he was convinced that high population growth is of major social concern, the solution should not be through artificial methods of birth control but through sexual abstinence and self-discipline. He argued that widespread use of artificial methods of family planning would ultimately lead to moral and social decay. The social reformers and intellectuals were unable to convince Mahatma Gandhi about their point of view until his death (Prabhu, 1959). Some traces of Gandhian moralistic opposition to the use of artificial methods of birth control still prevail among senior leaders of the Congress party.

However, rulers of some of the princely States in India considered high population growth as a hurdle to development and social welfare and started their own

family planning clinics. The Maharaja of Mysore officially commissioned two family planning clinics in 1930, one in Cheluvamba Hospital, Mysore and the other in Vani Vilas Hospital, Bangalore. These were the first two official family planning clinics to be started in the world. Thus we can say that at the national level India's concern about her high population growth in the context of poverty began in the Twenties, probably much earlier than in any other country in the world. It is ironical that we struggle with the same problems of high population growth and poverty even at the beginning of the twenty first century.

Trigger Factors for Policy and Action

The reports of two committees set up by the Government of India, just before Independence, seem to have largely shaped the pattern of health infrastructure, population policy and consequently the success or otherwise of the family planning programme in the country after Independence. The Bengal famine of 1943-44 resulted in 1.5 million deaths within a period of 12 months and made the Government of India and the officials aware of the precariously poor conditions of people and their extreme vulnerability during conditions of famine. The report of the Bengal Famine Inquiry Committee constituted by the Government of India was submitted in 1945. It contained a chapter on potential dangers to the economy and life of the people arising out of rapid population growth, especially the population living in abject poverty, deprived of the bare necessities of life, in precarious conditions without proper infrastructure, food storage and communication facilities. Mr R A Gopalaswamy of the Indian Civil Service (ICS) was the Member-Secretary of the Committee. He later became the Registrar General of India, in 1951, and conducted the first Census of the independent India. When he became the Chief Secretary of Madras Province in 1954, he introduced a strong incentive-based family planning programme. Similarly, the Bhore Committee which was set up in 1943 to make an assessment of the health conditions in India submitted its report in 1946 and recommended a suitable health infrastructure for the country. It also stressed the need for a national programme of birth control for improving the health of the population. The reports of these two committees, the Bhore Committee and the Bengal Famine Enquiry Committee, paved the way for the Government of India to adopt a National Programme of Family Planning after attaining Independence in 1947. With the death of Mahatma Gandhi in 1948, the moral objections to the adoption of artificial methods of birth control seemed to have waned. The official family planning programme was launched in 1952 as part of the first Five Year Plan (1951-56). However, the Congress Party, whose values and ideals were largely shaped by the Gandhian philosophy, retained all along, and still does to some extent, the moralistic objections to the free and unrestricted use of artificial methods of family planning.

Policies and Programmes from 1951 to 1976

This period covers the first twenty five years of the family planning programme implemented during the three five year plans, 1951-66; the inter-plan period 1966-69, the fourth five year plan 1969-74 and the first two years of the fifth five year plan 1975-76.

In April 1950, Government of India appointed a Population Policy Committee under the Chairmanship of Minister of Health, Rajkumar Amrit Kaur, and on the Committee's recommendations, a Family Planning Cell was created in the office of the Director General of Health Services. The first Five Year Plan document presented to Parliament in December 1952, referred to a programme for Family Limitation and Population Control, terms which may be considered, at present, objectionable on humanitarian grounds. It sought to reduce the birth rates to the extent necessary to stabilise the population at a level consistent with the requirements of the national economy. A sum of Rs 6.5 million (or US \$ 1.44 million at the exchange rate of 1 US \$ = Rs 4.5 that time) was allocated by the Central Government for the family planning programme which included a plethora of activities such as motivation, education, research and clinical services.

Research was undertaken on the effectiveness of rhythm method in controlling fertility in pilot studies at Ramanagarm near Mysore and Lodi Colony in Delhi. A Demographic Training and Research Center (now called the International Institute for Population Sciences) was established in Bombay in 1956 with the assistance of United Nations for undertaking training and research on population issues. Family Planning programme was intended to be promoted through a network of family planning clinics under the assumption that there was already some intrinsic demand for family planning services and that provision of supply through clinics would induce further demand. This clinical approach was intensified during the second Plan period 1956 to 61. The budget provision for family planning during this period was increased from Rs 6.5 million to Rs 50 million. But the actual expenditure incurred during the first and second five year plans was less than the budgeted amount, only Rs 1.5 and Rs 21.6 million respectively. The clinical approach of family planning promoted the methods of diaphragm, vaginal jelly, vaginal foam tablets, condoms in addition to natural methods and vasectomy in some States.

During the later half of the second plan, the scheme of giving some monetary incentives to acceptors of vasectomy (Rs. 10 per case) was introduced in Madras province by the State Government by R A Gopalaswamy, Chief Secretary of the State, who was earlier the Registrar General of India and Member Secretary of Bengal Famine Inquiry Committee. He postulated the concept of 'improvident maternity', which included all births of order 4 and above and he recommended that all of these births should be prevented by a strong programme of vasectomy, motivating men to undertake sterilisation operations after the third child. He also estimated, (rather crudely based on certain assumptions but not incorrectly), that if 7 vasectomies were done for 1000 population per year over a period of 10 years, covering couples with 3 or more children, all improvident births could be avoided and that the birth rate could be reduced by 40%. The seeds of an incentive-based, target-oriented and time-bound sterilisation programme were thus sown in Madras province in the late fifties and it was immediately adopted in Bombay province, the following year. It was adopted in the next plan period in the country as a whole. The number of family planning clinics, where family planning services including sterilizations were provided, increased from 147 at the end of the first Five Year Plan to 4,165 at the end of the second Five Year Plan.

The slow pace of increase in contraceptive acceptance by the end of the second plan and the poor attendance in the family planning clinics indicated that the demand for family planning from the people was not as high as was expected in the plan documents. Hardly 2% of eligible couples were protected. The clinic-oriented approach was therefore replaced by an extension- education approach in the third five-year plan (1961-66), which aimed at bringing the message and services of family planning to people in the four corners of the country, by house to house visits by the field staff employed in the network of Primary Health Centres and Sub-Centres in the rural areas and government hospitals in the urban areas. The shift from a clinical approach to an extension approach which continues to be a pervasive methodology of family planning programme till date, was based on the following premises:

1. There is a need to create a small family norm in the community by appropriate information - education - communication (IEC) procedures by involving opinion leaders. Six Family Planning Communication Research Centres were established in different parts of the country to carry out field based action-research, as well as social science and demographic research for identifying and resolving field based issues in the implementation of family planning programmes.
2. It is necessary to inform every eligible couple on the availability and use of contraceptive methods.
3. It is necessary to provide contraceptive services to all couples in a socially and psychologically acceptable manner.

During the third Plan period, family planning programme was thus made an integral part of the public health departments of all the States. It was considered part of health services in the country. The symbol of an inverted red triangle representing the message of family planning as its logo to stop family size with three children was introduced. Various innovative measures of popularising the programme were tried and, for the first time, a demographic goal was set. It was desired in 1962 that a crude birth rate of 25 should be achieved by 1972, a goal which has not been achieved even by 1999. Table-II provides the demographic goals set for the country as a whole by the Government of India in different plan periods and recent actuals.

HITTS Approach

During this plan period, the programme expenditure increased to Rs. 248.6 million; 11 times more than in the second plan. With the setting up of demographic goals for the programme, and achievement of these goals being made the responsibility of the health departments, the programme became entrenched in a **HITTS model**: i.e., health department operated, incentive based, target-oriented, time-bound and sterilisation-focussed programme. A separate Department of Family Planning was set up at the center and the Departments of Health in the States were renamed gradually as Departments of Health and Family Planning and family planning programme was fully funded from the central funds with staffing patterns and methods of functioning formulated by the central

government. In my view, 1962 was the beginning of the HITTS approach which lasted until 1976 with varying degrees of emphasis on each of its components viz: involvement of health and other government functionaries, change of incentives, targets and the time frame for achievement of targets, leading to the ‘coercive approach’ during 1976-77.

The period 1966 to 69 was termed a ‘plan holiday’. However, during this period, family planning programme was integrated not only in the health system but also specifically made a part of the maternal and child health programme implemented through the Primary Health Centres (PHCs) in rural areas and Urban Family Planning Centres in towns. The Government of India gave additional funds to state governments for recruitment of medical and para-medical workers including extension educators in their PHCs and urban health centres for working specifically for family planning and for achieving the targets. The expenditure during this three year plan-holiday, 1966-69 was Rs 704.6 million, almost three times the expenditure during the five years of the third plan. Expansion of personnel at the PHCs and Urban Family Planning Centres occurred rapidly to pursue the HITTS model. The 1961 census showed a continued rise in the population growth rate and continuing high fertility levels and necessitated in 1966, a postponement of the demographic goal of crude birth rate (CBR) of 25 to be realised as soon as possible, which was again revised in 1968 stipulating a CBR of 23 by 1978-79. (Table-II).

The family planning programme got a big boost from Government of India in the Fourth plan period 1969-74 when the budget was increased to Rs 3150 million, though the actual expenditure was only Rs 2844 million. Table-III provides the governmental expenditure on family planning over the years. The infrastructure was considerably expanded and there was a strong desire on the part of Government of India to resolve the population problem once and for all by intensifying on the HITTS model by organising vasectomy camps on a mass scale, so that these facilities are available for men in their own geographic proximity and the services of skilled surgeons could be optimally utilised. In order to help pregnant mothers with unwanted pregnancies to have safe abortions by medically skilled personnel, and not resort to unsafe back-street abortive procedures, a law liberalising induced abortion camouflaged under the term ‘Medical Termination of Pregnancy Act’ was passed by parliament in 1972. The incentive amounts provided to acceptors of vasectomy and tubectomy were substantially increased. Incentives were also provided to motivators and to state governments by the central government for their performance in family planning, which were based essentially on sterilizations done in relation to their population.

Desperate Action

However, the 1971 census data whose results were available in 1972 and 1973 indicated that the high rates of population growth have continued unabated during the decade. The population increased from 439.2 million in 1961 to 548.2 million in 1971, i.e. by 24.8 per cent as compared to 21.5 per cent in 1951-61. This continuing increase in population growth rate, in spite of the vast net work of personnel involved in the programme and sizeable expenditures from the center, frustrated the policy-makers and

programme administrators. It led to draconian measures during the Emergency period of 1975-76. The effective couple protection rate, which is an approximation for the contraceptive prevalence rate, but based on the programme service statistics, indicates that percentage of couples protected by any modern methods of family planning was only 14.7% by the end of March 1974.

The Fifth plan document which covered the period 1974-79, but was implemented only during 1974-78, refixed the demographic goals of achieving the birth rates as 30 by 1979 and 25 by 1984. The programme was given the highest priority by the central government during this period and the expenditure during 1974 to 1978 rose to Rs 4,090 million, almost double per year in the fourth plan. Mass camps were organised with greater frequency in more States. In some classic camps such as the one conducted in Ernakulam during 1972, 65,000 vasectomies were carried out in a fortnight's time. The government at the center was getting impatient on the population issue. In 1976, a comprehensive National Population Policy was formulated for the first time in India's history and was approved by Parliament.

The Emergency Period (Coercive Approach)

India went through a phase of national internal emergency under the Prime Ministership of Mrs Indira Gandhi during June 75 - March 77 when rights of individuals were abrogated, freedom of the press restricted and powers of the judiciary curtailed. The government at the center assumed enormous authoritarian powers over individuals and State governments. One major impact of this national emergency was felt on the population front. For the first time, a National Population Policy was formulated with at any public debate and adopted by the Parliament (April 76) which called for a 'frontal attack on the problems of population' and which inspired the State governments to 'pass suitable legislation to make family planning compulsory for citizens' and to stop child bearing after three children, if the 'State so desires'. Many other measures were introduced such as stipulation to government officials in the health and revenue departments to motivate given numbers of vasectomies from their areas of operation, failing which punishments were to be meted out to them. Various coercive tactics were used to control fertility levels, mainly through increased number of vasectomies. The Commissioner for Family Planning at the Centre assumed enormous powers under the programme and officials not only at the Centre but also in the States became more powerful. Incentive payments to acceptors were substantially increased and linked on a sliding scale to the number of living children a couple had at the time of accepting sterilisation. Innovative political and fiscal incentives were offered by Centre to the State governments to implement the family planning programme very seriously. Laws which made it compulsory for couples to stop reproduction after two or three children began to be drafted, and placed before state legislatures in Maharashtra and other states, for enactment.

By a Constitutional Amendment in 1976, representations to Parliament from each State were frozen at the 1971 census level upto the year 2001, making it politically unattractive for any State to increase its relative population size in the hope of securing

greater political strength at the Centre. Vasectomies were conducted at railway stations and at quickly arranged camp sites. It is alleged that in the northern States of Uttar Pradesh and Bihar men were forcefully subjected to sterilisation for one reason or the other. The strategy during this period can be termed as 'Coercion'. However, news of these excesses leaked out very quickly through informal channels and there was general public agitation brewing up all over the country. The number of sterilizations done in India during April 1976 to March 1977 was 8.26 million, more than the total number done in the previous five years and more than the number done in any other country in the world until that time. The cost per sterilization equivalent was the lowest during the emergency period, at Rs 200 per sterilisation compared to Rs 469 during 1973-74 and Rs 751 during the post emergency year 1977-78. Table-III provides the per capita expenditure on the family planning programme and cost per sterilization equivalent over different years.

However, during the period of emergency, partly due to excesses in sterilisation and partly for other reasons, there was large scale political unrest and general elections were called for in February 1977. The elections brought defeat to the Congress Party at the Centre and in most of the States. The oft-used cliché to characterise the compulsive family planning programme during the emergency period in India was that 'instead of bringing down the birth rate rapidly, the programme brought down the government'. A number of articles and books have been written on the period of Emergency in India, considered as dark age in Indian history and criticised widely both within and outside the country. It is surprising that under an authoritarian single party rule in China, the one child family norm, which is more stringent than the measures practised in India during the Emergency period, is continuing to be practised for almost two decades. Instead of any popular unrest or international condemnation, there was unabated appreciation of China's achievements in the field of population control. Even in India, the Chinese achievements in the field of population control continue to be lauded and form the basis for judging India's performance as poor.

Recoil and Recovery Phase 1977-94

There was a strong political reaction to the policy of April 1976 in the post Emergency government that assumed power in March 1977. There was a tremendous backlash on the family planning programme specially its insistence on targets for vasectomy. The new government changed the name of 'family planning' to 'family welfare', reduced the targets on sterilisation and chose to achieve demographic change through a programme of education and motivation. A judicial commission was appointed to enquire into the wrong doings during the Emergency period. A revised Population Policy adopted in 1977 was totally against compulsory sterilisation and legislation of any kind and stated that 'Compulsion in the area of family welfare must be ruled out for all times to come. Our approach is educational and wholly voluntary'. The 1977 policy was welcomed as a type of liberation for the expression of individual opinions and attitudes on family size and freedom of choice of the contraceptive methods to be used by couples. The backlash on the programme was felt severely on the number of vasectomies done in

the year 1977-78 which was less than 1 million, one fifth of the number performed in the previous year, although the expenditure incurred in that year remained the same as in the previous year. Figure-1 shows the trends in the levels of acceptance of different methods in the country as a whole over the years and Figure 2 on contraceptive prevalence rate and crude birth rate. However, the new government enacted into law the proposal by the earlier government to raise the minimum age at marriage of 18 for girls and 21 for boys, which came into operation in October 1978. During the provisional Sixth Plan period, 1978-79 and 1979-80, the programme expenditure was Rs. 2,260 million, almost equal to the amount spent in the previous two years. The period 1977 to 1980 can be considered to be a Recoil phase for the family planning programme.

The change of government again in January 1980 marked a turning point in the programme and helped to restore it, to some extent, with emphasis continuing on its voluntary nature. During the revised sixth Five Year Plan, 1980-85, a Working Group on Population Policy was set up by the Planning Commission to formulate long-term policy goals and programme targets for family welfare programmes. The long-term demographic goals were revised in terms of achieving Net Reproduction Rate (NRR-1) by the year 1996 for the country as a whole, on an average, and by the year 2001 in all the States. These goals are yet to be realised. It was assumed that fertility rates of a population are linked closely with the levels of development of the society, especially with female literacy and child mortality, and low fertility rates can be sustained only in the context of certain minimum levels of development and low mortality rates. These goals were translated into achieving a crude birth rate of 21, a crude death rate of 9, infant mortality rate of 60 and expectancy of life at birth of 64 years and contraceptive prevalence rate 60% among eligible couples by modern methods of family planning to be achieved in all the States by the year 2000. The health-based, time-bound target-oriented family planning programme was revived with reduced emphasis on sterilisation and greater emphasis on spacing methods and on child survival programmes. These were to be implemented through all the sub-centres and Primary Health Centres in the rural areas, without any aggressive campaigns or mass camps for sterilisation as were adopted in earlier years. With greater assistance from international organisations, especially the UNICEF and the WHO, Expanded Program of Immunisations (EIP) and Universal Immunisation Programmes (UIP) were launched in a systematic manner covering all the districts of the country in a phased manner.

However, the post-emergency collapse of the family planning programme could never be revived fully in the subsequent years, especially in terms of acceptance of vasectomy by men, as an easy, safe and effective method of family planning. With men almost refusing to come forward for vasectomy, and motivations for family size limitations continuing to rise because of the information-education campaigns and lack of easy availability of spacing methods, tubal ligation of women began to rise steadily and became a dominant method of family planning during the next five years. During the Sixth Plan (1980-85) an allocation of Rs 10,780 million was made in the sector of family welfare while the actual expenditure was higher at Rs 14, 480 million. The Sixth Plan increased the per-capita expenditure on family planning to its highest since the implementation of the programme to Rs. 700 per sterilisation equivalent.

The Seventh Plan implemented during 1986-91 continued the low key approach to family planning adopted in the Sixth Plan but witnessed a slow but steady increase in the number of acceptors of female sterilisation in family planning. (Figure-1). There was greater emphasis on spacing methods in this plan and incentives were offered to younger couples not to have more than two children. Special programmes to reduce infant and child mortality rates through universal immunisation programme (UIP) started earlier were replaced by a more broader programme of Child Survival and Safe Motherhood (CSSM) implemented in collaboration with the UNICEF. However, the reduction in birth rates were smaller than anticipated in the Seventh Plan.

By the late 'eighties, it came to be recognised that the mortality and fertility levels are declining rapidly in some States, more rapidly than anticipated. The crude birth rate of Kerala which was 37 in 1966, came down to 26 in 1976 and to 20.3 by 1988. This was below the goal of 21, the replacement level of fertility recommended in the Sixth Plan document. By 1986 infant mortality had declined to 27 infant deaths per 1000 live births, well below the goal of 60 recommended to be reached by the year 2000. Similarly, Tamil Nadu reduced its birth rate from 33.6 in 1970-72 to 23.1 by 1989, though its infant mortality in that year was 68, much higher than that of Kerala. Clearly something striking was happening in terms of demographic transition in the southern States. This phenomenon attracted scholars from various disciplines to analyse the factors that were behind such a transition and whether these could be replicated or adapted to other areas of the country where fertility levels were declining more slowly.

A major change in the political scenario of the country was introduced by late Prime Minister Rajiv Gandhi with the passing of 72nd and 73rd constitutional amendments and enactment of Panchayat Raj and Nagar Palika Acts in 1992 setting in motion the process of democratic decentralisation. These acts ushered in a three-tier system of political governance in the country, the central governments, the State governments and the panchayats in the rural areas and the Nagar Palikas in the urban areas upto the district level. By these, constitutionally the powers, responsibilities and resources are to be shared by these three tiers of elected bodies. The primary health care including family planning, primary education and provision of certain basic amenities to the people such as drinking water and roads became the responsibility of the Panchayats. Another notable feature of this Act is the reservation of one third of the seats in Panchayats for women members. Thus at the grass root level, women are politically empowered by this act, on all decision making issues pertaining to social development including family planning. This is a great leap forward for Indian democracy and empowerment of women. The process of this demographic decentralisation is still going on with varying speed and intensity in different States. Generally, the States are reluctant to share their powers and resources with the elected bodies of the Panchayats. In some States, such as Bihar, even elections to the Panchayats are yet to take place.

Family planning and primary health care, legally, are now in the domain of the Panchayats and Nagar Palikas. This democratic decentralisation has further infringed on

the powers of state governments to impose any strong family planning programme through its Primary Health Centres and Sub-Centres.

Another notable development from the early 1990's has been the organised intensification and expansion of women's movements within the country and outside, questioning the policies and directions of governments with regard to family planning programme in which women had to shoulder major responsibilities for fertility regulation and demographic transition. All family planning programmes, they argue, have been ultimately targeting women through propagation of female methods of family planning, in the context of a target-oriented and incentive based system. The preponderance of female sterilisations as the dominant method of family planning in the country, it was argued, was because of the pressure brought on women by the officials in the health department who were keen to fulfil their quotas of family planning. This was tantamount to an infringement of their fundamental rights. Thus the family planning programme landed itself in a quagmire where it could neither achieve its demographic goals of low fertility and population stabilisation (through birth rate goals converted into family planning targets and pursuing these targets) nor withdraw from such a programme in view of a continuing rise in the yearly additions to population.

In this context, the Government of India appointed, in July 1993, an expert group under the Chairmanship of the noted agricultural scientist, Dr M S Swaminathan for drafting a National Population Policy for the government's consideration and adoption by Parliament. This Committee submitted its report in 1994. It contained some basic directions of the shift in the goals of population stabilisation programmes and structurally organised motivations at various levels for their effective implementation. The recommendations made in the Report are yet to be accepted by the Government.

Surprisingly, the goals on fertility, mortality and contraceptive use set in the eighth plan period (1992-97), on levels to be achieved by the end of the plan period (1996-97) have indeed been realised. (Table-II).

Reproductive and Child Health Approach (RCH)

The Reproductive and Child Health (RCH) approach to family planning and population stabilization owes its origin mainly to the realisation in government circles, from the early 'nineties, that the target oriented approach to family planning was leading to large scale statistical manipulations of official data, deterioration in the quality of services offered to couples and greater suffering imposed on women in this country. These factors have been recognised in the Report of the National Committee on Population Policy, headed by M S Swaminathan, which was submitted to the Government of India in June 1994. The deliberations and recommendations of the International Conference on Population and Development (ICPD), organized by the United Nations and held in Cairo in September-October 1994, gave a fillip for specific action to be taken by the Government of India. The Programme of Action adopted at the ICPD in Cairo, to which the Government of India is a signatory, recommended that population policies should be viewed as an integral part of programmes for women's

development, women's rights, women's reproductive health, poverty alleviation and sustainable development. Women's concern dominated the discussions at the Cairo conference, which felt that population policies which are based on macro demographic considerations and acceptor-target-driven programmes are unnecessarily and unevenly burdening women with the task of regulating reproduction to suit macro level policies. They argued that, henceforth, population policies should not be viewed with the sole concern of reductions in fertility rates, considered desirable by planners and demographers, but with considerations of reproductive health, reproductive rights and gender equity. It was argued that developmental programmes which are not engendered are not only non-sustainable but also endangered. The Programme of Action adopted by the ICPD recommends a set of qualitative and quantitative development goals. These are: sustained economic growth in the context of sustainable development; education , especially for girls; gender equity, equality and empowerment of women; infant, child and maternal mortality reduction; and the provision of universal access to reproductive health services, including family planning and sexual health.

The Government of India, which was a signatory to ICPD Programme of Action, promptly followed up on the recommendations for which they were already prepared by abolishing the acceptor-based family planning targets since April 1995, in the country as a whole. It had already experimented with the 'target-free' approach in a few selected districts in the previous year but the effectiveness of the approach was not properly assessed. Since October 1997, officially, the Reproductive Health Approach has been adopted as the national policy of the Government of India. The official RCH programmes cover the conventional maternal and child health services including immunization of children and contraceptive services to couples, treatment of reproductive tract infections (RTIs) and sexually transmitted diseases, provision of reproductive health education and services for adolescent boys and girls, screening of women near menopausal age for cervical and uterine cancer and treatment where required. The finances required for these additional services intended to be covered under reproductive health are quite high; but some additional financial support is being received from external donor agencies, mainly from the World Bank and the European Commission. However, the budget allocations to RCH are not adequate to meet all the services included in the programme, especially identification and treatment of RTIs and STDs. Fears have been expressed in many quarters that the emphasis on contraceptive services will get diluted and even the existing unmet needs of couples for contraceptive services, for spacing and limitation of children, may not be met, if budgets are not adequately increased to cover the wider goals of RCH programmes. Population concerns go beyond reproductive health though it is also an important contributing factor for population stabilization.

These fears have been partly justified from an analysis of recent trends in contraceptive acceptance in most parts of the country after the Target Free Approach (TFA) was implemented. The number of acceptors of all methods of contraceptives, excepting oral pills, has declined substantially after the contraceptive targets in most of the States have been withdrawn since 1995. Figure-1 depicts the contraceptive acceptance trends of different methods over the years.

Table-IV presents data on effective contraceptive protection rate (CEP) (based on official service statistics) from 1994 to 1997 and the crude birth rate (CBR) from 1995 to 1998. The Table reveals that the CEP value is the same at 45.4% in 1994 and 1997. However, during the period 1995 to 1998 the crude birth rate has declined by 1.9 points from 28.3 to 26.4. This is an anomalous situation because, with contraceptive protection rate remaining unaltered, the crude birth rate cannot be expected to go down significantly, as stated above, unless one or more of the following factors have been operating during the same period -

- (a) The earlier CEP levels for 1994, under the target approach, has been an exaggerated figure;
- (b) The acceptors under the target free approach (TFA) in 1997 comprise of more fertile women, younger and at lower parity, recruited by the programme; this can result in greater impact on fertility with lower acceptance.
- (c) There has been greater acceptance and use of contraceptives from outside the non-governmental sources, not included in official statistics; and
- (d) There has been a wider practice of induced abortion as a family limiting method.

Empirical evidence from a few selected States indicates that all the above factors seem to be operating with varying intensity in different States. The inconsistency between changes in the contraceptive protection rate (CEP) and crude birth rate (CBR) for each of the States and Union Territory is also indicated in Table-V. From this Table, it can be seen that in a number of States, the inconsistency gaps are really large. For example, in Maharashtra the contraceptive protection rate (CEP) has declined during 1994 to 1997 by 3 percentage points from 54% to 51%; but during the period 1995 to 1998 the birth rate has also declined by 2.2 points from 24.5 to 22. The inconsistency gap between CEP and CBR, which can be measured by the sum of these two in absolute terms is 5.2 points. The States and Union Territories which have experienced an inconsistency gap between CEP and CBR of 4 or more points are Assam (6.1), Bihar (4), Maharashtra (5.2), Tamil Nadu (4.6), Chandigarh (5.0) and Delhi (11.7). These inconsistencies between CEP and CBR are to be explained, through well designed scientific studies, if the target free approach (TFA) has to be justified on the ground that it improves the number of motivated and more fertile couples who adopt family planning methods from the official channels, though affecting their numbers somewhat adversely.

Political Implications of High Differential Growth

The population of India as of 1st July 2000 has been estimated at 1002 million. (Figure-2). With a birth rate of 26.4 and death rate of 9.0 for 1998, it is growing at 1.74% per year adding 17 million annually. Among the larger States, the growth rates vary from a low of 1.0% to 1.2% in Tamil Nadu and Kerala to a high of 2.2 % and 2.3% in

Uttar Pradesh and Rajasthan. Such an order of differentials in growth rates has been going on for the past two decades. The States have been growing at different rates. The political and socio-economic implications of the persistence of such high growth differentials among the States are quite high and the apathy of the leadership to this fundamental problem is appalling. The widening demographic diversity of India's population, especially between the southern and the northern States, are yet to be fully realised.

One implication is at the political level. With universal adult franchise guaranteed to every citizen above 18 years of age, the States that have a higher rate of population growth will have a proportionately larger number of representatives in the Indian Parliament. States with higher growth rates tend to have an increasingly greater representation in Parliament and hence better political leverage compared to the States which have a slower rate of growth of population. Indian leaders were aware of this problem and seem to have resolved it very wisely, by a Constitutional Amendment and with an Act of Parliament in 1977, by which the number of representatives to Parliament from each state was frozen at the 1971 census level. This freeze will be in effect until 2000. The constitution 42nd Amendment Act 1976, section 15, specifically ensures that those states that do well in family planning programmes and control their growth rates are not penalised by reduction in their representation to Parliament. This amendment is applicable only upto 2000. As the law stands at present, from the year 2001 the figures of 2001 census can become the basis for reallocation of the number of seats to Parliament from each of the States. If this is done, U.P. is expected to gain 8 seats from 85 to 93, Rajasthan 4 seats from 25 to 29, Madhya Pradesh 3 seats from 40 to 43 and Haryana 1 seat from 10 to 11. On the other hand, the States that have been relatively successful in family planning programmes will lose their representation in Parliament. Tamil Nadu will lose 6 seats from 39 to 33, Kerala 4 seats from 21 to 17, Andhra Pradesh 1 seat from 42 to 41, and Manipur one seat from 2 to 1. By the year 2016, the States of Uttar Pradesh, Rajasthan, Madhya Pradesh and Bihar will gain by 14, 5, 4 and 2 seats respectively and the States of Tamil Nadu, Kerala, Andhra Pradesh and Karnataka will lose 8, 4, 3 and 1 seats respectively, compared to the 1991 levels. Table-VI gives the distribution of seats in the lower house of Parliament (Lok Sabha) as at present and how things will change if the existing freeze is lifted by the year 2000 and the censuses of 2001 and 2011 are to form the basis for political representation in Parliament.

In the current context of still-widening growth differentials among the States as revealed by the 1991 census and the recent projections by the Technical Group of the Planning Commission, there is an urgent need for the continuation of the 1977 freeze on the representation to Parliament from different states for at least another 20 years i.e upto 2018 or until the growth differentials narrow down whereby replacement levels of fertility are realised in every large state. This is necessary not only to encourage accelerated demographic transition in the large Hindi speaking states but also to preserve national integrity. Otherwise, states that have successfully implemented the national population policy and achieved lower levels of population growth rates as stipulated in the various developmental plans, will be unfairly penalised.

An Overview of Population Policies and Programmes Implemented

A critical study of the population policies and programmes adopted in India since 1951 reveals the following major deficiencies and possible corrective measures:

1. The programme placed almost total emphasis on sterilisation as the major method of family planning and the quality of services offered has been extremely poor. There is an urgent need to expand the range of choice of contraceptives and the quality of services to couples. Though there are wide inter-state differentials in these two aspects, generally the conditions are poor in most of the States. In the context of a very high level of unmet need for family planning, expressed by the women themselves in many sample surveys even in those States where fertility is very high, attention to these two aspects alone will help bring down fertility levels quickly in those states where they still remain high. There is no need for slogans like 'one is fun' to motivate couples to adopt small family norm any more. The need of the hour is the offer of 'choice of methods and quality of service'.
2. Though the period of Emergency witnessed unnecessary imposition of coercive methods of family planning and has been strongly criticised nationally and internationally, it also witnessed introduction and enactment of some far reaching legislation, such as the Minimum Age at Marriage Act and the freezing of the seats in Parliament and State legislatures on the basis of 1971 census until the year 2000, eliminating the political temptation for the States to have a higher rate of population growth. There is a need to extend this freeze until 2026 or until all the States reach the replacement level of fertility, whichever is earlier.
3. Until the Sixth Five Year Plan (1980-85), demographic goals were set in terms of crude birth rate and the target was set in terms of number of sterilisation operations to be carried out on the basis of population size. These are no longer valid criteria for programme implementation. Though the target-free approach has come into vogue officially by orders from the Centre since April 1995, many States are continuing in their old groove of targets and sterilization. State specific actions on this front are urgently called for. Because of the rigidity in the organisational pattern for maternal, child health and family planning programmes throughout the country and the strong insistence of the government at all levels (Centre, State and the district) on achieving the targets on sterilisation, the delivery of maternal and child health services have suffered over the years. This has to be corrected.
4. The offer of incentives to acceptors, motivators, medical and paramedical personnel involved with the sterilisation programme gave a commercial touch to the whole idea and in the hands of unscrupulous administrators many 'ineligible cases' were sterilised to gain monetary benefits at the individual or State level. On many occasions, in order to get awards from the central government as the best performing State in the family planning programme, the numbers of sterilisations performed were manipulated. The quality of services at the time of sterilisations and follow-up care for cases with complications left much to be desired. The programme lost much of its popularity among the people though the motivational and educational programmes on small family norms have been fairly

successful. All incentives to acceptors should be in the form of high quality of services and range of choice and any incentive should, if at all, be given to communities towards developmental programmes.

5. The performance of the different States in family planning even under a common population policy and financial assistance from the Centre over the past three decades has varied widely. States such as Kerala, Tamil Nadu, and Andhra Pradesh were most successful in their family planning programmes and in the extent of reduction in the fertility level than States like Uttar Pradesh, Rajasthan, Bihar and Madhya Pradesh. The factors underlying the poor performance of the latter States are to be found at the state level; the bureaucratic inefficiency of the States, the low level of political commitment of the leaders to the programme at the state level and the poor progress of the States in related areas of socio-economic development especially female literacy and child health and survival. In most States, rise in the educational levels of females has been found to increase the desire for small family norm and demand for family planning methods. The specific cultural aspects of the population that lower the status of women in the States also found to be weakened with female education. In this context, there is a need to develop population policies at the State level with focus on female education and delivery of good quality services. The Central government could play the role of friend, philosopher and guide, provide financial support and monitor the quality of services offered.
6. The programme implicitly assumed that all married women in the reproductive ages are equal partners or contributors to the fertility of the population. No attempt was made to identify relatively more fecund couples and target the programme to them. Birth-based approach to family planning, in which services are focussed on pregnant women and recently delivered mothers, is likely to be more effective. (Srinivasan and Rajaram, 1997)
7. Many authors have noted (Srinivasan, 1995; Narayana and Kantner, 1992) in their critical studies of the population policy in India that the processes of decentralisation of political power and decision-making through "The Panchayati Raj" system will eventually contribute to better quality of services, including health and family planning services. Hence decentralisation of RCH services at the Panchayat level can be expected to contribute to faster demographic transition.
8. Demographically, the impact of the programme implemented so far has been towards reduction in the fertility rates among women above the age of 30, because of the emphasis on sterilisation as the major method of family planning. The programme was nibbling, as it were, on the tail end of the fertility curve. The natural fertility or fertility of women in the absence of contraception has been increasing during the past three decades among women below the age of 30 because of the forces of modernisation. We have thus a peculiar situation wherein the fertility rate of married women in the age group of 20 to 29 has been increasing for the past three decades in a number of States though significant declines in fertility have been observed only among women above the age of 30. The combination of these two factors has contributed to very slow decline in total fertility rates (TFR), in some States, even in the context of a rise in contraceptive

use. With increasing emphasis on spacing method and quality of care we can hope to witness a more accelerated decline in fertility in the coming years.

9. The recent paradigm shift of the family planning programme as a part of the enlarged Reproductive Health and Child Services package is a welcome step in the right direction. This will enable the programme to care for women's health especially their reproductive health, fulfil their unmet needs for family planning in terms of spacing of children and limitation of family size, treatment of reproductive tract infections and sexually transmitted diseases and improve the quality of maternal and child health services. However, implementation of a larger package of services requires additional funds and commitment from the government. India barely spends eight percent of its GDP on essential health and education services, and the expenditure on family welfare is merely one percent of its GDP. India spends far less on its educational and health programmes than many other developing countries. Unless statements of intention on reproductive health are backed by higher financial commitments from the government to the social sectors, the great expectations can hardly be translated into tangible achievements.
10. Analysis of recent data during 1994 to 1998 on Contraceptive Protection Rate (CPR) and Crude Birth Rate (CBR) indicates that there are gross inconsistencies between the trends in contraceptive protection rate and crude birth rate during this period in most of the States. The acceptance of all methods of family planning, except the oral pill, declined substantially in most of the States during this period after the introduction of the target free approach. However, during the same period, there has been substantial decline in fertility as well. There are gross anomalies emerging between trends in contraceptive use within the programme and fertility levels. These anomalies have to be explained based on empirical data to be compiled from carefully conducted studies before the target free approach can be justified on the ground that the fertility impact of the lowered level of acceptance of contraceptive methods under TFA has contributed to the observed decline in fertility.

TABLE I

Population Increase in the Century, 1901-2001, India and States

Country/State	Population Size in Thousands			Percentage share of increase in Population during the Century	
	1901	1951	2001	1901-51	1951-2001
All India	238396	361088	1012386	15.85	84.15
Andhra Pradesh	19066	31115	76392	21.02	78.98
Arunachal Pradesh	N.A.	N.A.	1217	N.A.	N.A.
Assam	3290	8029	26492	20.42	79.58
Bihar	27311	38782	101819	15.40	84.60
Delhi	406	1744	14366	9.58	90.42
Goa	476	547	1627	6.17	93.83
Gujarat	9094	16263	48972	17.98	82.02
Haryana	4623	5674	20120	6.78	93.22
Himachal Pradesh	1920	2386	6805	9.54	90.46
Jammu & Kashmir	2139	3254	10071	14.06	85.94
Karnataka	13055	19402	52720	16.00	84.00
Kerala	6396	13549	32530	27.37	72.63
Madhya Pradesh	16861	26071	81189	14.32	85.68
Maharashtra	19391	32003	92057	17.36	82.64
Manipur	284	578	2569	12.87	87.13
Meghalaya	340	606	2484	12.41	87.59
Mizoram	82	196	972	12.81	87.19
Nagaland	102	213	1721	6.86	93.14
Orissa	10302	14646	36156	16.80	83.20
Punjab	7545	9161	23794	9.95	90.05
Rajasthan	10294	15971	54509	12.84	87.16
Sikkim	59	138	570	15.46	84.54
Tamil Nadu	19253	30119	62252	25.27	74.73
Tripura	173	639	3859	12.64	87.36
Uttar Pradesh	48628	63220	174290	11.61	88.39
West Bengal	16940	26300	79991	14.85	85.15
Union Territories					
Andaman & Nicobar	25	31	394	1.63	98.37
Chandigarh	22	24	907	0.23	99.77
Dadra & N. Haveli	24	42	194	10.59	89.41
Daman & Diu	32	49	142	15.45	84.55
Lakshadweep	14	21	72	12.07	87.93
Pondicherry	246	317	1134	8.00	92.00

TABLE II
Desired Demographic Goals : India (1962-98)

Year of Statement	Specified Goal	Target Year for Achieving Goal
1962	CBR,25	1972
1966	CBR,25	as promptly as possible
1968	CBR,23	1978-79
1969 (start of Fourth Five-Year Plan)	CBR,32	1974-75
	CBR,25	1979-81
1974 (start of Fifth Five-Year Plan)	CBR,30	1979
	CBR,25	1984
April 1976 (First Population Policy)	CBR,30	1978-79
	CBR,25	1983-84
April 1977 (Second Population Policy)	CBR,30	1978-79
	CBR,25	1983-84
January 1978 (Central Council of Health)	CBR,30	1982-83
January 1981 (Sixth Five-Year Plan, 1980-85)	NRR,1; CBR,21; CDR,9; e ^o , 64 years; CEP, 60%	2000
Seventh Five-Year Plan (1985-90)	NRR,1 CBR,29.1; CDR,10.4; IMR,90; CEP,42% universal immunization antenatal care-75%	by 2006-11 by 1990 by 1991 by 1990
Eighth Five-Year Plan (1992-97)	e ^o - Male e ^o - Female IMR CDR CBR GFR	Goals 1991-92 1996-97/2006-07 Actuals 57.7 60.1 66.1 59.7 (1991-95) 58.7 61.1 67.1 60.9 (1991-95) 78.0 68.0 48.0 72 (1996) 10.0 8.7 7.4 9.0 (1996) 28.9 25.7 21.7 27.5 (1996) 130.3 113.0 91.4 117.0(1995)

Note: CBR= crude birth rate; CDR= crude death rate; CEP= percentage of eligible effectively protected
GFR= general fertility rate; IMR= infant mortality rate; e_0 = life expectancy at birth; NRR= net production rate
Source: Srinivasan K, 1995 (Table 2.1)

TABLE III

Governmental Expenditure on Family Planning Programs: India (1951-96)

Five-Year Plan	Period	Total (millions)	Per capita	Per Sterilization equivalent
First	1951-56	1.45	0.00	N.A
Second	1956-61	21.56	0.05	N.A
Third	1961-66	248.60	0.54	N.A
Annual	1966-67	134.26	0.27	110.41
	1967-68	265.23	0.52	126.97
	1968-69	305.15	0.59	162.49
Fourth	1969-70	361.84	0.68	218.11
	1970-71	489.04	0.90	306.03
	1971-72	617.56	1.11	248.91
	1972-73	797.48	1.41	236.43
	1973-74	578.46	1.00	469.15
Fifth	1974-75	620.48	1.05	378.80
	1975-76	806.14	1.33	262.75
	1976-77	1729.82	2.79	199.68
	1977-78	933.37	1.48	751.51
Annual	1978-79	1075.45	1.66	576.65
	1979-80	1185.11	1.79	547.39
Sixth	1980-81	1408.98	1.79	568.37
	1981-82	1930.20	2.10	584.55
	1982-83	2883.20	2.79	614.89
	1983-84	3829.84	5.31	666.06
	1984-85	4240.66	5.80	763.40
Seventh	1985-86	4796.80	6.37	719.89
	1986-87	5688.50	7.40	801.21
	1987-88	5841.70	7.67	828.72
	1988-89	6718.40	8.41	926.17
	1989-90	8006.60	9.59	1129.35
	1990-91	8658.32	10.23	1222.58
Eighth	1991-92	10075.14	11.67	1504.43
	1992-93	10904.00	12.38	1550.41
	1993-94	13126.23	14.62	1652.97
	1994-95	15348.76	16.76	1840.60
	1995-96	16023.90	17.15	1947.25
	1996-97*	15350.00	16.16	N.A

* Allocation Note:

N.A = not available.

Source: India, Ministry of Health and Family Welfare, Department of Family Welfare,
Year Books for various years

Table IV
Family Planning Performance and Crude Birth rates in different Plan Periods-India (1956-97)

Plan & Period	Sterilizations (in' 000)			IUD	Equivalent	CEP by	CBR by the
	Male	Female	Total	(in' 000)	CC Users	end of	End of Plan
					(in' 000)	period(%)	Period
Second Plan	71	82	153	N.A	N.A		
1/1956 - 12/1960	(46.4)	(53.6)	(100)			0.2	41.4
Third Plan	1069	305	1374	813	582		
1/1961 - 3/1966	(38.6)	(11.0)	(49.6)	(29.4)	(21.0)	2.7	41.1 ^b
Interplan Period	3817	575	4392	2057	96		
4/1966 - 3/1969	(51.5)	(7.8)	(59.3)	(27.7)	(13.0)	7.9	38.8 ^c
Fourth Plan	6571	2433	9004	2149	3010		
4/1969 - 3/1974	(46.4)	(17.2)	(63.6)	(15.2)	(21.2)	14.7	34.5
Fifth Plan	8437	4795	13232	1946	3253 ^a		
4/1974 - 3/1978	(45.8)	(26.0)	(71.8)	(10.6)	(17.6)	22.5	33.3
Sixth Plan I	864	2398	3262	1186	6538 ^a		
4/1978 - 3/1980	(7.9)	(21.8)	(29.7)	(10.8)	(59.5)	22.3	34.0
Sixth Plan II	2808	14637	17445	7172	32502 ^a		
4/1980 - 3/1985	(4.9)	(25.6)	(30.5)	(12.6)	(56.9)	32.1	32.6
Seventh Plan I	3151	20582	23733	21353	67566 ^a		
4/1985 - 3/1990	(2.8)	(18.3)	(21.1)	(19.0)	(60.0)	43.3	30.2
Seventh Plan II	429	7787	8216	9756	35101 ^a		
4/1990 - 3/1992	(0.8)	(14.7)	(15.5)	(18.4)	(66.1)	43.6	29.2
Eighth Plan @	568	17215	17783	24310	84541 ^a		
4/1992 - 3/1996	(0.4)	(13.6)	(14.0)	(19.2)	(66.8)	46.5	27.5 ^d

Note: ^a Includes equivalent pill users also. CC = Conventional contraceptives; CEP = Couples effectively protected; IUD = intrauterine device; N.A = not applicable.

Figures in parantheses include percentage of total acceptors including sterilizations, IUDs and equivalent CC users.

b - Mid of 1961-71; c - For 1970; d - For 1996

@: Data for the period 4/1992 to 3/1996

Source: Year Books 1989-90 and 1994-95, Family Welfare Program in India; Ministry of Health and Family Welfare, Department of Family Welfare.

Table V

Number of Parliament Seats at Present and likely number in future (if 'freeze' is lifted)				
	Actual	Actual	Likely number of seats if 'freeze' is lifted	
	1971	1991	2001	2016
Major states				
Andhra Pradesh	41	42	41	39
Assam	14	14	14	14
Bihar	53	54	54	56
Gujarat	24	26	26	26
Haryana	9	10	11	11
Karnataka	27	28	28	27
Kerala	19	20	17	16
Madhya Pradesh	37	40	43	44
Maharashtra	45	48	49	47
Orissa	20	21	19	18
Punjab	13	13	13	12
Rajasthan	23	25	29	30
Tamil Nadu	39	39	33	31
Uttar Pradesh	85	85	93	99
West Bengal	40	42	42	42
Smaller states				
Arunachal Pradesh	1	2	1	1
Goa	2	2	1	1
Himachal Pradesh	4	4	4	4
Jammu&Kashmir	6	6	5	5
Manipur	2	2	1	1
Meghalaya		2	1	1
Mizoram		1	1	1
Nagaland	1	1	1	1
Sikkim		1	1	1
Tripura	2	2	2	2
Union Territories				
Andaman & Nicobar Islands	1	1	1	1
Chandigarh	1	1	1	1
Dadra & Haveli	1	1	1	1
Daman & Diu		1	1	1
Delhi	7	7	7	7
Lakshadweep	1	1	1	1
Pondicherry	1	1	1	1
Anglo Indians	2	2	2	2
Total	521	545	545	545

TABLE VI

Recent Trends in Contraceptive Prevalence (CEP 1994-97) and Crude Birth Rate (1995-98)

States	CEP				CBR				Increase in CPR (94-97)	Decline in CBR (95-98)	Consistency
	1994	1995	1996	1997	1995	1996	1997	1998			
Andhra Pradesh	48.2	49.4	48.3	46.9	24.2	22.8	22.5	22.3	-1.3	1.9	IC
Assam	23.6	22.6	21.2	19.1	29.3	27.6	28.2	27.7	-4.5	1.6	IC
Bihar	24.1	22.4	23.1	21.1	32.1	32.1	31.7	31.1	-3	1	IC
Gujarat	58.2	61	59.5	57.4	26.7	25.7	25.6	25.3	-0.8	1.4	IC
Haryana	54.9	56	54.7	53.9	29.9	28.8	28.3	27.6	-1	2.3	IC
Karnataka	50.3	52.7	54.3	55.6	24.1	23	22.7	22	5.3	2.1	C
Kerala	51.5	50.7	48.8	46.7	18	18	17.9	18.2	-4.8	-0.2	C
Madhya Pradesh	43.1	48	49.1	47.4	33.2	32.3	31.9	30.6	4.3	2.6	C
Maharashtra	54	54.1	53.5	51	24.5	23.4	23.1	22.3	-3	2.2	IC
Orissa	39	40.6	40.6	39.5	27.8	27	26.5	25.7	0.5	2.1	C
Punjab	77.4	79.1	81.2	76.9	24.6	23.7	23.4	22.4	-0.5	2.2	IC
Rajasthan	30.3	30.2	30.7	32.6	33.3	32.4	32.1	31.5	2.3	1.8	C
Tamil Nadu	54.9	54.8	53.5	51.7	20.3	19.5	19	18.9	-3.2	1.4	IC
Uttar Pradesh	36.5	37.1	40.7	37.2	34.8	34	33.5	32.4	0.7	2.4	C
West Bengal	34.9	35.7	35.2	34.2	23.6	22.8	22.4	21.3	-0.7	2.3	IC
Himachal Pradesh	56.5	57.9	57.4	55.3	25.2	23	22.6	22.5	-1.2	2.7	IC
J&K	20.1	19.2	18.3	17.6	NA	NA	NA	19.8	-2.5	NA	NA
Manipur	23.7	23	23.6	23.7	20.6	19.6	19.7	19	0	1.6	IC
Meghalaya	4	4.3	4.2	4	29	30.4	30.2	29.2	0	-0.2	IC
Nagaland	6.4	9	8.5	8.1	NA	NA	NA	NA	1.7	NA	NA
Sikkim	21	21.7	22.7	23.7	22.5	20	19.8	20.9	2.7	1.6	C
Tripura	19.4	23.8	24.9	26.3	18.9	18.4	18.3	17.6	6.9	1.3	C
A&N Islands	43.7	44	43.5	40.9	18.7	18.5	18.6	17.7	-2.8	1	IC
Arunachal Pradesh	12.2	12.9	13.3	12.1	23.8	21.9	21.4	21.9	-0.1	1.9	IC
Chandigarh	41.7	40.9	39.7	38.3	19.5	17.5	18.8	17.9	-3.4	1.6	IC
D. & N. Haveli	43.6	41.2	37.8	35.6	29.7	28.9	28.2	34.1	-8	-4.4	C
Delhi	41.7	40.6	37.4	33.9	23.3	21.6	21.1	19.4	-7.8	3.9	IC
Goa	34.9	34.8	34.1	32.9	14.7	14.4	14.2	14.2	-2	0.5	IC
Daman & Diu	36.5	37	36.7	36.8	21.8	21.6	24.9	21.5	0.3	0.3	C
Lakshadweep	8.4	8	8.2	9.6	25.5	23.4	22.9	22.9	1.2	2.6	C
Mizoram	45.9	47.3	46	44.2	NA	15.1	15	15.8	-1.7	NA	NA
Pondicherry	63.4	64.8	65.9	65.7	20.1	18.1	18.4	18	2.3	2.1	C
All India	45.4	45.8	46.5	45.4	28.3	27.5	27.2	26.4	0	1.9	IC

Figure-1

Acceptors of Family Planning Methods

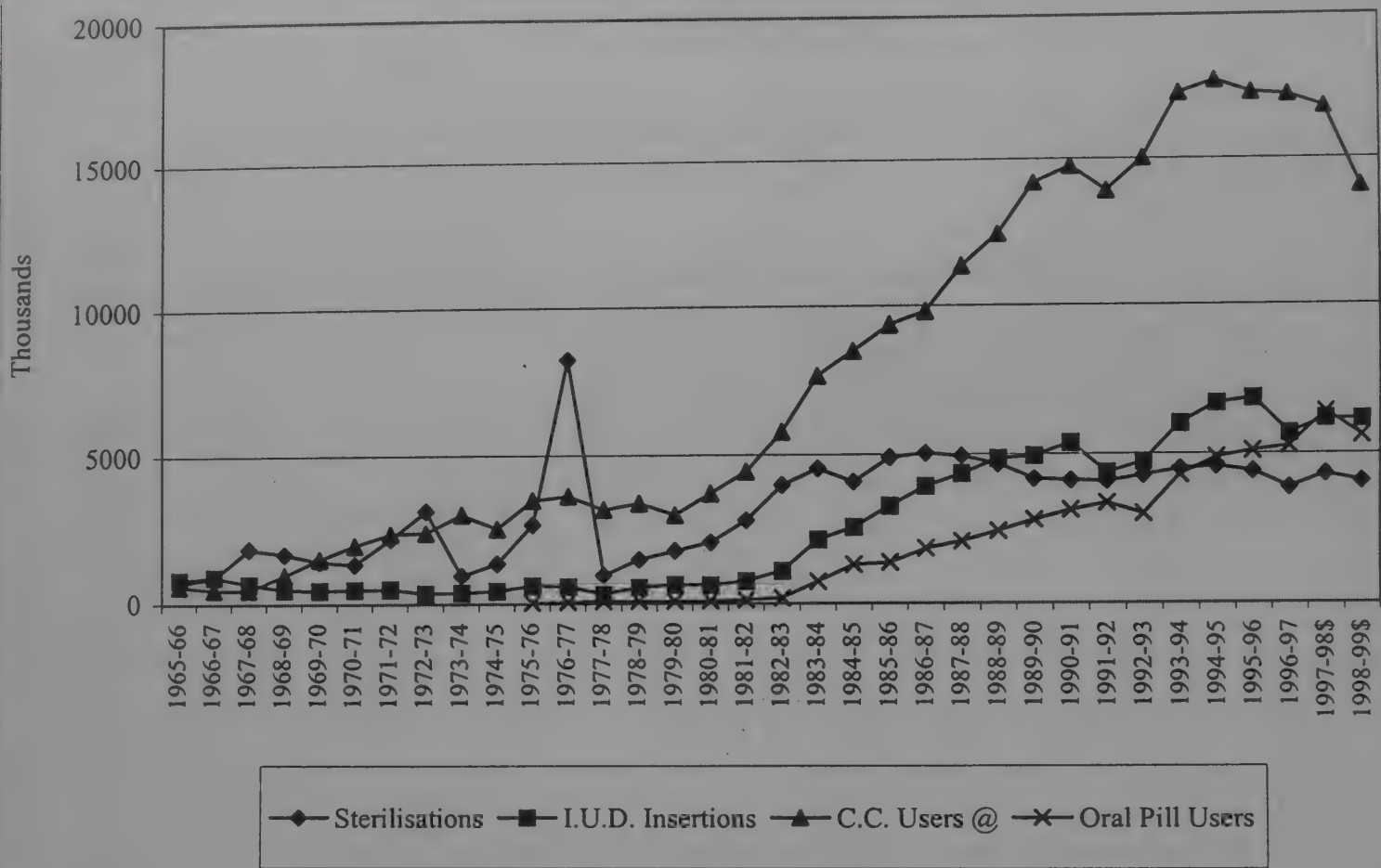
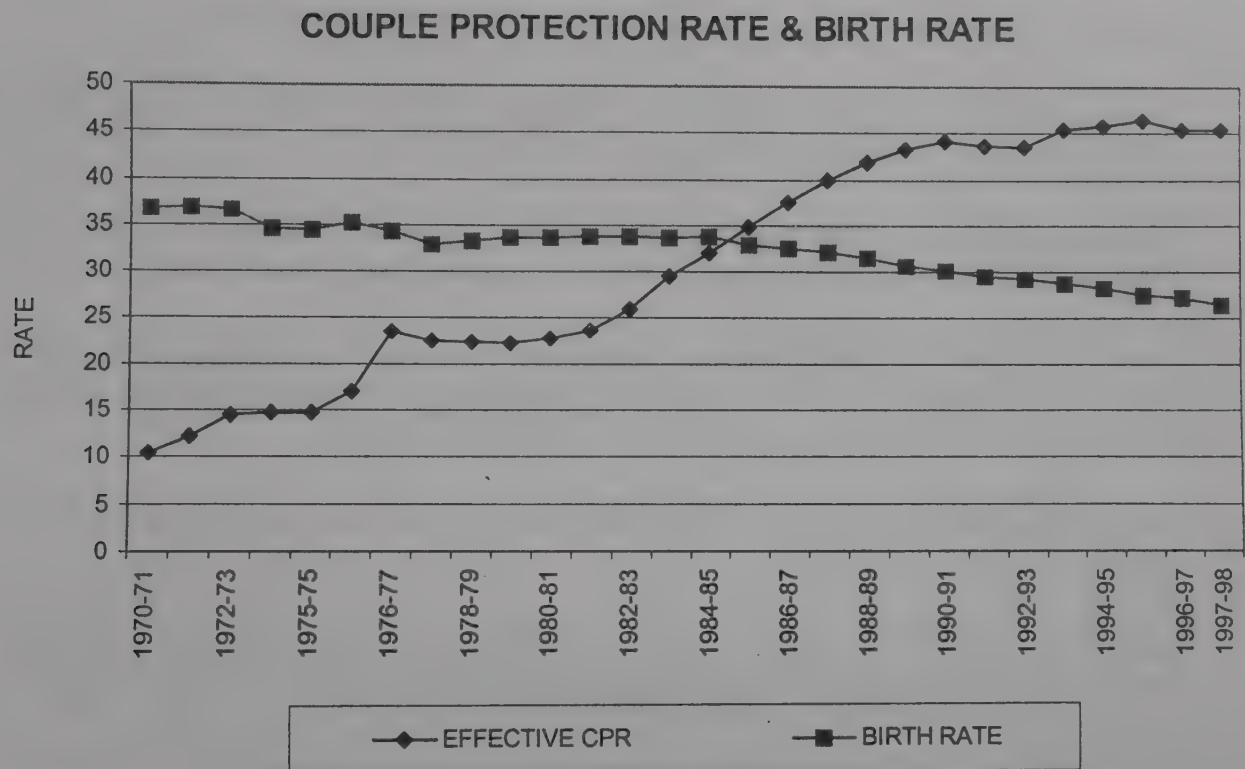


Figure-2



Source:- Registrar General India
Department of Family Welfare

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TOWARDS AN EVERGREEN REVOLUTION IN AGRICULTURE

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The term 'Green Revolution' coined by Dr. William Gaud of the US department of agriculture in 1968, has come to be associated not only with higher production through enhanced productivity, but also with several negative ecological and social consequences. There is also frequent reference to the 'fatigue of the Green Revolution' due to stagnation in yield levels and to a larger quantity of nutrients required for producing the same yield as in the early 1970s. Experts have been warning about an impending global food crisis due to increasing population, increasing purchasing power leading to the consumption of more animal products, increasing damage to the ecological foundations of agriculture, declining per capita availability of land and water, and the absence of technologies that can further help to enhance the yield potential of major food crops.

Should we therefore assume that as we enter a new century we will not have the benefit of new technologies which can help farmers produce more food and other agricultural commodities from less land and water?

We believe we are now in a position to launch an 'Evergreen Revolution' that can help increase yield, income and livelihoods per unit of land and water, if we bring about a paradigm shift in our agricultural research and development strategies. The Green Revolution was triggered by the genetic manipulation of yields in crops such as rice, wheat and maize. The Evergreen Revolution will be triggered by a farming systems that can help produce more from the available land, water and labour resources without either ecological or social harm. Thus, progress can be achieved if we shift our mind set from a commodity centered approach to an entire cropping or farming system. This does not mean that we should decelerate our efforts in crop improvement research. But research should be tailored to enhance the performance and productivity of entire production systems. The transition from the fatigue of the Green Revolution to an Evergreen Revolution involved a shift from a crop-centered to a systems-based approach to technology development and dissemination.

Let us take, for example, the prospects for 'super-rice, capable of yielding over 10 tonnes of rice per hectare'. Such a rice plant will need a minimum of 200 kg of nitrogen per hectare, together with other macronutrients and micronutrients. Addition of such nutrients solely through mineral fertilizers will lead to serious environmental problems, hence, the introduction of legumes in the rotation becomes important.

Scientists now have unique opportunities for designing farming systems to achieve the triple goals of more food, more income and more livelihoods per hectare of land, provided we harness the tools of echo technologies resulting from a blend of traditional knowledge with frontier technologies. Such tools include biotechnology, Geographic Information Systems (GIS) mapping, space technology, renewable energy technologies (solar, wind, biomass and biogas) and management and marketing technologies. We can enter a century of hope only if we abandon the old concept of a crop centred Green Revolution and replace it with farming systems and frontier technologies centred Evergreen Revolution.

Industrial countries are responsible for many global environmental problems such as potential changes in temperature, precipitation, sea level and incidence of ultraviolet radiation. While further agricultural intensification in industrialised countries will be ecologically disastrous, the failure to achieve agricultural intensification and diversification in developing countries where farming provides most of the jobs will be socially disastrous. This is because agriculture, including crop and animal husbandry, forestry and agroforestry, fisheries and agro industries provides livelihoods to over 70 per cent of India's population. The smaller the farm the greater is the need for higher marketable surplus to increase income. As many as eleven million new livelihoods will have to be created every year in India and these must come largely from the farm and rural industry sectors. Important food and other agricultural commodities will thus have the same impact as importing unemployment.

Those who advocate going back to the old methods of farming ignore the fact that only a century ago when the population of undivided India was 281 million, famines claimed 30 million lives between 1870 and 1900. The famine eradication strategy comprising the following steps is perhaps the most important achievement of post independence India:

1. Enhanced production and productivity
2. Adequate grain reserves
3. Purchasing power enhancement through various employment generation and guarantee schemes
4. Special intervention programmes for children, pregnant and nursing mother, and old and infirm persons.

While famines have been prevented, widespread undernutrition prevails among the economically underprivileged. Since non-food factors such as health care, environmental hygiene and literacy play an important role in promoting sustainable food security at the level of the individuals, we should revisit our strategy along the following lines. First, sustained physical access to food will involve a transition from chemical and machinery intensive to ecological farming technologies. Second, the emphasis on economic access underlines the need for promoting sustainable livelihoods through multiple income earning opportunities. Third, environmental access involves on the one hand, attention to soil health care, water harvesting management and the conservation of forests and biodiversity and on the other to sanitation, environmental hygiene, primary health care and primary education.

If the political vision to implement this mission is forthcoming population stabilisation can be more readily achieved. The prediction of the French philosopher, Marquis de Condorcet made in 1795 that population will stabilise itself if children are born for happiness and not just for existence will then come true.

The emphasis on the individual is important, since the household is often not a homogeneous unit. Women and girls tend to suffer more from undernutrition than men and boys. The Human Development Report contains distressing data on the growing feminisation of poverty. To give operational content to such a concept of food security, we should initiate a Hunger-free Area Programme (HFAP) with the following objectives:

1. Ensure sustainable availability of food by maintaining the growth in food production over population growth, through the development and dissemination of eco-technologies, supported by appropriate packages of services and public policies. Eco-technology involves blending ecological prudence and technologies of the past with the best in frontier technologies, particularly biotechnology, information technology, space technology, renewable energy technology and management technology. Without eco-technological empowerment, farmers will not be able to produce more food and other agricultural commodities on an environmentally sustainable basis from fewer land, water and energy resources.
2. Sustain the productivity of the natural resources base by conserving and improving the ecological foundations essential for continuous advances in crop and animal productivity.
3. Ensure adequate household incomes through promotional social security such as accessing assets, employment and organisational and marketing empowerment. Agricultural programmes should aim at more food, more jobs and at more income. Integrated attention to farm and non-farm employment and value addition to primary agricultural commodities will be necessary to enhance income and rural livelihood security. Above all, we should ensure that macro-economic and global trade policies do not destroy micro-enterprises supported by micro-credit.
4. Provide entitlement of food for the vulnerable groups through protective social security measures such as employment guarantee and food for nutrition programmes.
5. Introduce a National Food and Livelihood Security Act with the concurrence of the National Development Council for the purpose of paying integrated attention to important issues. These include conserving land, water, forests and biodiversity, and protecting the atmosphere; enhancing productivity through eco-technologies; improving distribution to eliminate endemic hunger; maintaining adequate food security reserves; strengthening the techno-infrastructure for better post-harvest technology; expanding the coverage of sanitary and phytosanitary measures; and developing efficient research, education, extension and marketing systems to take full advantage of emerging opportunities in international trade and to ensure that research and extension designed to promote the good of the public receive adequate support.

NEW STRATEGY

New technologies supported by appropriate services and public policies have helped prove doomsday predictions wrong and have led to the agricultural revolution (the Green Revolution) becoming one of the most significant of the scientific meaningful revolutions of this century. Four thousand years of wheat cultivation led to Indian farmers producing 6 million metric tonnes of wheat in 1947. The Green Revolution in wheat helped surpass in four years the production accomplishments of the preceding 4,000 years, thus illustrating the power of technological changes. There are uncommon opportunities now to harness the power of a new social contract among science, society and public policy to address contemporary development issues like the growing rich-poor divide, feminisation of poverty, famine of jobs, human numbers exceeding the population supporting capacity of ecosystems, climate change and loss of forests and biodiversity.

Fortunately, modern information technology provides opportunities for reaching the 'unreached'. Computer aided and internet-connected 'Virtual Colleges' linking scientists and women and men living in poverty can be established at local, national and global levels for launching a knowledge and skill revolution. This will help create better awareness of the benefits and risks associated with Genetically Modified Foods, so that both farmers and consumers will get better insight into the processes leading to the creation of novel genetic combinations.

The Yield Revolution

India's current position in the world in a few major crops is given in the **Table-I**. In several crops, and more particularly in wheat, our farmers have made striking progress. In 1947, we produced a little over 6 million tones of what. In 1999, our farmers harvested over 72 million tones, taking our country to the second position in the world in wheat production.

The high position we occupy in the production of several crops is to a considerable extent due to the large area covered under those crops. As will be evident from the data in the table, our position in productivity is, however, unenviable. In a way, this is a blessing since the yield gap represents an untapped production reservoir, from which we can derive benefit in the coming decades.

The position in pulses illumines the pathway for a new strategy in agriculture. We occupy the first position in the world in both area and production of pulses, but the 118th position in productivity. A major reason for our low average yield is the cultivation of pulses mostly under conditions where soils are both thirsty and hungry.

A Pulse Technology Mission now exists and it will be prudent to link it to the watershed development movement recently launched by the government. Our experience in organizing Pulse villages in the dry districts of Pudukkottai and Ramanathapuram in Tamil Nadu, India, indicates that we can make rapid progress in improving the production and productivity of pulses, provided the farming families of the village/watershed cooperatively undertake the harvesting of every drop of rain water. There will be no cooperation in water harvesting unless there is equity in water sharing. This is where high value but low water requiring crops play an important role in ensuring that the resource-poor farm men and women get maximum income from the available water.

Productivity improvement will be possible only if we pay greater attention to improving the efficiency of input use, particularly nutrients and water. To cite just one example, our cotton yields are less than 20 per cent of the yields achieved in several other countries such as Egypt and the USA. However, we are using 25 times as much water to raise a tonne of cotton as compared to that done by California. Normally, to produce 1 tonne of grain about 1,000 tonnes of water may be needed but in most cases we are using much more.

To bridge the gap between actual and potential yields prevailing at the currently available levels of technology, we have to undertake a multi-disciplinary analysis in

different regions and farming systems. For example, in rice, which occupies the largest area among food crops, the opportunities for rapid progress are great. The growing availability of rice hybrids increases the prospects for rapid progress in productivity improvement.

Wheat

We now occupy the second position in the world in wheat production. We grow bread, durum (macroni) and dicoccum wheats. In order to meet the needs of our growing population, it will be necessary to produce about 110 million tones of wheat by 2020. This is entirely feasible both because of the untapped yield potential in several wheat growing areas and because of the possibility of introducing hybrid wheat. Our aim should be to become the number one country in wheat production by 2010. We should also produce in the Himalayan region hard wheats to satisfy the needs of automatised bakeries.

If we enable farmers with appropriate technologies, services, prices and markets, our average yield can go up to 42 quintals per hectare from the present 27 quintals per hectare. Yield improvement should be our goal in every crop and farm animal. This will be possible if our farm families can be helped to improve the efficiency of use of water, nutrients, plant protection chemicals, and post-harvest technology.

Resource Management

The future of small farm families belongs to taking agriculture to precision, which involves the use of the right inputs at the right time and in the right way. Biotechnology will play an important role in all the following six major components of integrated natural resources management and precision farming:

- ❖ Integrated Gene Management
- ❖ Efficient Water Management
- ❖ Integrated Nutrient Supply
- ❖ Soil Health Care
- ❖ Integrated Pest Management
- ❖ Efficient Post-harvest Management

Eco-technology based precision farming can help cut costs, enhance marketable surplus and eliminate ecological risks. This is the pathway to an Evergreen Revolution in small farm agriculture. It is now widely realized that the genes, species, ecosystems and traditional knowledge and wisdom that are being lost at an increasingly accelerated pace, limit our options for adapting to local and global change, including potential changes in climate and sea level. The Global Biodiversity Assessment estimates that about 13 to 14 million species may exist on our planet. Of this, less than 2 million species have so far been scientifically described. In particular, our knowledge of soil micro-organisms is still poor. Also, biosystematics as a scientific discipline is tending to attract very few scholars among the younger generation.

Another important paradigm shift witnessed in recent decades in the area of management of natural resources is a change in the concept of 'common heritage'. In the past, atmosphere, oceans and biodiversity used to be referred to as the common heritage of humankind. However, recent global conventions have led to an alteration in this concept in legal terms. Biodiversity is recognized under the Convention on Biological Diversity as the sovereign property of the nation in whose political frontiers it occurs.

Under the UN Convention on the Law of the Sea, nations with coastal areas have access to a 200-mile Exclusive Economic Zone (EEZ). For example, the ocean surface available to India under the EEZ provision is equal to two-thirds of the land surface available to the country. The Climate Convention and the Kyoto Protocol provide for both common and differentiated responsibilities to countries. Thus, the global commons can be managed in a sustainable and equitable manner only through committed individual and collective action among nations.

While we have some knowledge of variability at the ecosystem and species levels, our knowledge of intra-specific variability is poor, except in the case of plants of importance to human food and health security. The Global Biodiversity Assessment warns, "unless actions are taken to protect biodiversity, we will lose forever the opportunity of reaping its full potential benefit to humankind". What kind of action will help us ensure not only the conservation of biodiversity, but also its sustainable and equitable use? In my view, we must foster an integrated Gene Management System in every state of the country.

The Integrated Gene Management System includes in situ, ex-situ and community conservation methods. The traditional in situ conservation measures comprising a national grid of National Parks and protected areas are generally under the control of government's environment, forest and wildlife departments. The exclusive control of such areas by government departments has often led to conflicts between forest dwellers and forest dependent communities, and forest officials. The non-involvement of local communities in the past in the sustainable management of forests has resulted in a severe depletion of the forest resources in India. It has become clear that sole government control alone will not be able to protect prime forests or regenerate degraded forests.

CONCLUSION

Attention to on-farm and non-farm employment with particular emphasis on women and landless labour families will be essential to provide access to food to the economically disadvantaged population. A massive investment in post-harvest technology and sanitary and phytosanitary measures and spreading awareness of food safety standards will be necessary to achieve both value-addition to primary products as well as to expand home and international trade in agricultural commodities.

Planning of agriculture in villages around towns and cities will help increase farmers' income and rural employment considerably, since urbanization is accompanied by greater demand for horticultural and animal husbandry products. Above all, we must step up our efforts to attract and retain educated youth in farming through spreading science-based precision farming techniques which are both intellectually stimulating and economically rewarding.

Table I

India's Current Position and Goal						
Crop	Area (1,000 hectare)		Production (million tones)		Productivity (kg/hectare)	
	India	Highest	India	Highest	India	Highest
Wheat	25122 (3)	China 29001	72.0 (2)	China 109.005	2493 (32)	Ireland 8997
Rice	42700 (1)	India	82.2 (2)	China 190.100	2811 (51)	Ukraine 7444
Maize	6150 (5)	USA 29602	8.66* (9)	USA 236.604	1408 (105)	UAE 18636
Sorghum	11700 (1)	India	10.50* (2)	USA 20.39	897 (51)	France 6182
Potato	1089 (3)	China 3502	17.94* (6)	China 46.05	16478 (51)	Ukraine 43966
Pulses	25604 (1)	India	14.8 (1)	India	608 (119)	France 4769
Cotton	8300 (1)	India	14.0 (3)	China 18.75	922 (57)	Israel 4527
Sugarcane	3870 (2)	Brazil 4826	289.7 (2)	Brazil 324.435	65892 (34)	Peru 121361
❖ *Production figures for India are 1998-99 estimates taken from the Economic Survey. For the rest of the world, production figures correspond to the year 1996						
❖ Figures pertaining to productivity and area correspond to the year 1996. Figures in parenthesis indicate rank						
❖ 1996 production figures used for those items.						

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**MEDIUM TERM STRATEGIES FOR MEETING
THE NUTRITIONAL NEEDS OF THE POPULATION**

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The population of India (which in the pre-independence era, included Pakistan and Bangladesh) had risen from 238 million in 1901 to about 345 million in 1947, an increase of just 107 millions in 46 years; Population growth had been controlled during this period, not as a result of efficient contraception but because of recurrent large-scale famines and acute pestilence. On the other hand, the population of India (without Pakistan and Bangladesh) had soared from 361 million in 1951 to 950 million by 1997- an increase of about 600 million in the last 46 years . This was brought about by the steep reductions in mortality, a side effect of development. It is projected that at the current total fertility rate of 2.9, the population of the country by the year 2010 will be 1162 million.

As a result of this phenomenal rise in population, much of India's developmental effort (as, indeed that of other Asian countries) during the last few decades had to be devoted towards achieving an increase in food production commensurate with population growth. The total food grain production in India had increased from 50.9 million tonnes in 1950 to 199.3 million tonnes by 1997, and the per capita food grain availability was maintained despite population growth. Famines were averted. But population growth had nearly nullified the benefits of development, more so in some Asian countries, than in others. As a result, India has not as yet been able to achieve the desired improvement in the quality of its Human Resources; and even in the latest Human Development Report of the UNDP (1999)¹, it remains in the 'Medium Human Development' category.

Apart from this disturbing population growth, the per capita requirement for food is also expected to rise as millions who are currently trapped in poverty cross the poverty line to join the ranks of an expanding 'middle class'. The scope for further expansion of land resources for food production being limited, increased food production to meet increasing population needs must be achieved through significant increase in production per unit of land. Can we achieve this increase; and having achieved it, how do we ensure equitable access to such foods for the millions who are currently trapped in poverty? This is the crucial question.

However, despite the enormous strain on resources imposed by population growth, the last 50 years have not been barren of impressive achievements. Apart from acute large-scale famines which have now been practically eliminated, florid clinical manifestations of severe malnutrition like kwashiorkor, keratomalacia, beri-beri and pellagra are now, no longer the major Public Health problems that they once were. Apart from population growth, the major attributes of developmental transition have been: urbanisation; changes in occupational pattern; changes in family structure; changes in life-style and value systems; changes in dietary practices; environmental degradation and progressive ageing of populations. All these attributes have had important effects on the over all pattern of morbidity in the populations.

While much of the improvement in the nutritional status of our population may be attributable to the progressive reduction of poverty and removal of socio-economic disabilities, not all changes can be explained on this basis. The changing epidemiology of nutrition-related diseases is sometimes due to fortuitous or unforeseen factors incidental to the developmental process. Experiences with four classical nutrition-related diseases, namely, pellagra, lathyrism, fluorosis and goitre- the epidemiology of which has dramatically changed, highlight this phenomenon. The change in respect of each of these diseases has been brought

about not necessarily because of steps deliberately designed to remove socio-economic inequalities, leading to better nutrition, but due to the intervention of unforeseen factors unleashed by the developmental process. As we move into the next millennium, new discoveries and new initiatives are bound to find application as part of ongoing "development". Some of these may have unforeseen effects, sometimes beneficial and sometime not. Scientists are not always the masters of Human Destiny and of the environment. This must be a sobering thought. Continuous monitoring of nutritional status and nutritional surveillance are critical inputs for ensuring rapid recognition of problem and appropriate immediate remedial interventions. It is also important to be vigilant, monitor the effects of new interventions in a fast changing world on the nutritional and health status of populations and on the course of diseases that affect them ².

NEED FOR A PARADIGM SHIFT IN OUR NUTRITION POLICIES

Developmental transition during the last few decades apart from increase in population numbers, has also brought about a significant 'qualitative' change in the demographic nutrition profile. As a result there has been a progressive –though painfully slow- movement of the population away from poverty and towards affluence. The time has now come for a paradigm shift in national nutrition policies in recognition of this changing nutrition profile. The earlier strategies which were largely in the nature of "holding operations" that had helped to buy precious time and hold Malthusian fears at bay, were based on such limited goals as "freedom from hunger", "child survival" and "safe-motherhood", and are no longer appropriate. Children must 'live' not just 'survive'; mothers must be educated, productive and resourceful, not just 'safe' for reproduction; people must be optimally nourished not just "free from hunger". Dietary excesses among the relatively affluent must be avoided and life styles consonant with good health must be promoted.

It is therefore appropriate that in recent years the term '**nutrition security**' has progressively replaced '**Food Security**' as being our major policy objective. This change in terminology also hopefully implies a change in the concept of our ultimate nutrition goals. 'Food security' in earlier years was largely interpreted as being the achievement of adequacy with respect to energy needs. The calorie adequacy yardstick- was being used to assess 'success', and the emphasis was on food grains. This narrow concept which was probably adequate in earlier years when 'survival strategies' were largely in place; now needs to be enlarged. Nutrition security must mean adequate access not only to energy rich cereals, but to a range of foods whose intake in judicious amounts could provide balanced nutrition. The attempt must be to provide 'qualitative' improvements in the diets of the poor population; using foods, which are well within their reach. Nutrition security should also imply the adoption of strategies, which will ensure cleanliness, and wholesomeness of foods to avoid infections and toxicants. It should also include nutrition education in order to ensure equitable intrafamilial distribution of food in accordance with physiological needs. It is through this enlarged concept of 'Nutrition Security' that we can hope to combat the emerging nutrition problems of the next century.

The achievement of Nutrition Security, involves the fulfilment of two essential requisites, namely, the achievement of: (1) adequacy of food supply at the overall national level and; (2) equitable distribution of food among the population in accordance with their physiological needs. It is apparently the latter requirement that has often proved the more

difficult to fulfil. Thus according to FAO, in every continent (except Africa) the relative adequacy of food had, infact, improved substantially between the 70s and 90s; and yet the energy consumption by the poor had not increased.

STRATEGIES FOR ACHIEVING FOOD ADEQUACY AT THE NATIONAL LEVEL

Green Revolution

India's current position in this world in a few major crops is given in Table-I³. In several crops and more particularly in wheat, our farmers have made striking progress. In 1947, we produced a little over 6 million tonnes of wheat; in 1999, our farmers harvested over 72 million tonnes, taking our country to the second position in the world in wheat production. The high position we occupy in the production of several crops is to a considerable extent due to the large area covered under those crops. As will be evident from the data in Table-I, our position in productivity is however unenviable. In a way, this is a blessing since the yield gap represents an untapped production reservoir, from which we can derive benefit in the coming decades. Productivity improvement will be possible only if we pay greater attention to improving the efficiency of input use, particularly nutrients and water.

Reversing The Fatigue Of The Green Revolution:

The intensive agricultural technology that had been adopted earlier as part of the Green Revolution had not always been pursued with appropriate precautions. Intensive irrigation and heavy use of chemical fertilisers should always have gone hand in hand with periodic soil testing and soil replenishment. Loss of soil micronutrients and soil fertility could have thus been avoided. Irrigation without arrangement for drainage has often contributed to increasing salinity of the soil. The indiscriminate use of pesticides, fungicides and insecticides have caused adverse biological balance. Unscientific, excessive tapping of underground water through thousands of tubewells has led to the rapid exhaustion of this important resource. Exploitive agriculture adopted in the Green Revolution in India should have rested on a proper scientific and training base; this unfortunately has not always been the case.

The Green Revolution has also led to some unfortunate imbalances with respect to food production. Attention was almost solely bestowed on wheat and rice to the relative neglect of pulses, millets and vegetables. The per caput availability of pulses, an important source of lysine, riboflavin and folic acid has now diminished. Millets which were the main staple of the rural poor, have now been practically displaced by wheat and rice. These important food items could have provided much-needed micronutrients. Horticulture has also failed to receive adequate attention, with the result that there have been no great gains with regard to production of vegetables; and nearly a third of vegetables and fruits produced continue to perish. Agro-based industries and village level technologies for preservation and storage of fruits and vegetables were not adequately encouraged. As a result while our country managed to avoid hunger and famine, and achieved adequacy with respect to energy requirement, the diets of the poor continued to be unbalanced and deficient in nutrients. Some degree of security against famines was achieved but not Nutrition Security. The challenge before agricultural scientists now is to reverse these trends and ensure balanced, sustainable ecologically sound agricultural development.

Nutrition security cannot be achieved by reliance just on one staple. Diets exclusively based on rice or wheat will be deficient in a range of micro-nutrients apart from being relatively poor in protein quality. Diversification of household diets is necessary, and a national food production policy should aim at the achievement of balanced production and availability of a range of basic essential foods. The achievement of satisfactory levels of milk production in India is for instance, highly conducive to nutrition security. "Operation Flood" which has now made India the leading milk producer in the world, is a striking example of what a developing country can achieve through the efficient implementation of a well-thought out programme. Likewise the production of pulses and vegetables and fruits must also now be augmented.

Harnessing Emerging New Technology:

Even if we succeed in imparting a "second wind" to the Green Revolution of earlier years, it is unlikely that the expanding food needs of the next century will be met. We must therefore opt for the judicious use of new technological break-throughs that offer promise. The phenomenal population growth in developing countries has led to shrinking per capita land resources; and food needs can be met only if we are able to produce substantially more food per unit of land, in ways that do not involve ecological and social harm.

Genetic Engineering:

New genetic technologies offer promise of opportunities for breeding food crop varieties for resistance, tolerance to biotic and abiotic stresses, drought and salinity resistance and even better nutrient quality. Rice for example, could be genetically engineered to contain Vitamin A. Genetic technology applied to horticulture could result in the production of vegetables and fruits with improved micronutrient content and better acceptability. Large private corporations of USA and Europe are currently making major investments in using these technologies to produce new plant varieties for large-scale commercial agriculture. Much of this action is now occurring in the industrial countries under the purview of proprietary science. The free flow of knowledge and information, possible in the days of earlier Green Revolution, could now prove difficult for developing countries which need to benefit most from these new technologies.

There is currently widespread concern regarding the safety of some genetically modified foods and some of these may prove to be genuine. There seems to be a polarisation of views regarding the safety of these foods; the 'go-ahead' optimism of USA is not apparently being shared by Europe. The present concerns relate to the possible direct effects of the transferred genes on the recipient organisms; on possibilities of unfavourable recombinations; on the behaviour of these foods under actual field conditions; allergenicity and toxicity of these foods; on environment and biodiversity; and on nutritional quality. A recent statement⁴ issued by the Royal Society of London on "Genetically modified plants for food use" and recent papers on this subject by Swaminathan⁵ and Paroda⁶ present a somewhat balanced and not-too-euphoric picture. Recent data provided by USDA would suggest that euphoria with respect to genetically modified foods may, as yet, be premature. The U.S. Department of Agriculture has just released figures for 1997 and 1998 on the

country's performances of genetically modified cotton, maize and soyabeans. Some of the genetically modified crops produce the insecticide Bt. Others are modified to tolerate high doses of herbicide glyphosphate. According to this report, farmers who had shifted to genetically engineered crops were getting no better yields than farmers who continued to grow traditional varieties and they seem to need similar quantity of pesticides. In one region in the mid-west of America, however, farmers planting Bt maize had yields 30% higher than those growing ordinary crops. USDA officials admit that at face value, figures available so far do not provide much support for those who argue that genetic engineering will bring almost a revolution in agriculture.

There is clearly a need to collect convincing evidence of the efficacy and safety of genetically modified foods before they can gain general public acceptance. A precautionary package for the safe and beneficial use of genetically modified foods needs to be developed. Ethical codes for experimentation and field-testing need to be in place as also national and international protocols to ensure biosafety.

Biotechnology will play an important role in all the following major components of integrated natural resources management and Precision farming.

- Integrated Gene Management
- Efficient Water Management
- Integrated Nutrient Supply
- Soil Health Care
- Integrated Pest Management
- Efficient Post-harvest Management

Ecotechnology based precision farming can help to cut costs, enhance marketable surplus and eliminate ecological risks. This is the pathway to sustained improvement in small farm agriculture.

Eco-Biotechnology:

Apart from genetic engineering modern biotechnology also offers other promising priorities of procedures for augmenting of food production, less likely to cause concerns and more in consonance with ecological safety. Thus the Tata Energy Research Institute (TERI) in India has recently developed bio-fertilisers known as mycorrhiza, that help various kinds of vegetables and fodder crops to increase their yield by an impressive 30% -50%. Mycorrhiza are a mixture of fungi that attach themselves to plant roots and develop a symbiotic relationship with them. They are able to fix nitrogen from the air, absorb phosphorous and other nutrients present in the soil in low concentrations and transfer them to the plants. The advantages of this technology are its low input of chemical fertilisers and improvement in soil health and prevention of plant diseases. Each plant species seems to benefit only from specific strains of that fungi. The same technology has also been shown to be able to grow crops on fly-ash ponds and waste lands- something that would have seemed impossible a few years ago. Relatively inexpensive and ecologically safe technologies of this kind could be developed for wide use in developing countries.

There are similar, as yet untapped, opportunities for developing techniques, which can lead to high food productivity without adverse impact on the natural resource base. Blending traditional and frontier technologies could lead to the birth of such useful eco-technologies. An example of traditional technology in the area of water harvesting comes from the deserts of Rajasthan in India where traditionally women continue to harvest water in simple structures called 'Kund', as a result of which drinking water is available even in an area with less than 100mm annual rainfall⁵.

The concept of intellectual property rights needs to be widened to include the rights and expectations of holders of such traditional knowledge. FAO has been a pioneer in the recognition of contribution of farm families to the conservation, and enhancement of genetic resources and has always supported the concept of 'farmers rights'. The challenge is to be able to achieve a judicious blending of traditional and frontier technologies in a manner that will, on the one hand, increase efficiencies, production and income generation, and on the other hand, will cause no adverse impact on national resources or on prevailing cultural practices.

Food Processing and Preservation:

There is considerable scope and need for the expansion of agro-based industries in villages and townships. This could create job opportunities for women and men. This could also lead to better production and more effective utilisation of local food resources by the community, and reduce the present considerable loss of perishable food items. Local women's organisations could be entrusted the responsibility of organising village level feeding programmes in schools and welfare programmes instead of dependence on foods donated by foreign organisations and alien to the local dietary culture. Nutrition and welfare programmes could then become programmes of the people, by the people, for the people.

For India still struggling to find its feet in the present transitional phase of development, it is important to ensure that decentralised small-scale food systems which are today providing great employment opportunities to women and men in the countryside are not replaced overnight by global agro-business corporations who are now attempting to control the entire food chain. Wheat and wheat flour, for instance, provide livelihood and nutrition to millions of men and women in India. In the current decentralised small-scale economy, based on millions of producers, processors and traders, people are the substitutes for capital and infrastructure. India should be careful not to allow this traditional approach to be hijacked by global agro-business in the name of modernisation.

Planning of agriculture in villages around towns and cities will help to increase farmers' income and rural employment considerably, since urbanisation is accompanied by greater demand for horticultural and animal husbandry products. Above all, we must step up our efforts to attract and retain educated youth in farming through spreading science-based precision farming techniques which are both intellectually stimulating and economically rewarding.

Golden Revolution

Horticulture and human nutrition

Most of the horticulture crops, particularly fruits and vegetables, have been associated with human health since ancient times. They are generally good sources of NSP/fibre, carotenoids, vitamin C, folate, potassium and other vitamins, minerals and bioactive compounds. Some specific vegetables are good sources of B vitamins, calcium and iron. Dried fruits are concentrated sources of energy, sugar, dietary fibre and iron and potential source of vitamins, minerals, carbohydrates, proteins etc.

Fruits and vegetables are now being extensively advocated as essential ingredients of a balanced human diet to meet the daily requirements for the body functions, and more importantly for prevention of serious disorders such as night blindness, anemia, etc. due to micro-nutrient deficiencies, particularly in children and women ⁷. The WHO report "Diet, Nutrition and Prevention of Chronic Diseases" of 1990 recommended a goal of at least 400 grams of vegetables and fruits daily (in addition to potatoes) including, within that, at least 30 grams of legumes, nuts and seeds. However, as per the Recommended Dietary Allowance (RDA) of ICMR, a balanced diet should contain, besides other things, 280 grams of vegetables including tubers, and 90 grams of fruits per day. The average intake was, however, only 46 grams of fruits and 92 grams of vegetables in the eighties, which has now improved in the last few years, particularly in the urban areas due to higher income levels and marked improvement in the production and availability of the fruits and vegetables in the country. Work in recent years in different laboratories has provided a strong evidence that diets rich in these commodities protect against incidence of cancer.

Carrot, rich in vitamin A, has been reported to block the division of cancer cells through the production of retinoic acid, which reverses the growth-promoting effects on oncogenes, the mutated genetic material that induces cancer ⁸. Similarly, curcumin in turmeric is reported to inhibit cancer growth in 60 per cent of colon tumors induced in rats. It has anti-inflammatory properties and acts as an antioxidant. Tomato, the rich source of lycopene, is also reported to have an inverse association with the risk of prostate cancer. Grapefruit, has been reported to have the ability to reduce the LDL (low-density lipoproteins) cholesterol levels, leaving the HDLs, the good cholesterol intact, thus helping in preventing heart attacks due to atherosclerosis. The pectin in this fruit, particularly in the rind portion, helps in reducing plaque build-up in the arteries of animals ⁹.

India today, is the second largest producer of fruits and vegetables in the world. This is primarily because of the development and adoption of location-specific improved technologies, investments in agriculture, availability of inputs and more important the receptiveness of the farmers to the new methods and use of required inputs duly supported by the favorable Governmental policies.

Horticulture enterprise is based on a few major attributes the land possesses. Horticulture crops contribute higher production from a unit area than cereals, have potential for exports and, therefore, add to the income of the producers and the nation. The total production of these crops in 1997-98 was nearly 125 million tons from only 24.5 million

hectares as compared to 193 million tons of food grains from 124 million hectares in the same year^{10,11}. One hectare under vegetables yields 10 to 30 tons and above of produce as against 2 to 3 tons of cereal crops. Consequently, the earnings from the same area are higher because of higher yields and also because of higher prices these commodities command in domestic as well as international markets. Further, growing these crops create better employment opportunities for both skilled and unskilled workers through providing raw material for the processing industry, besides being labour intensive during their production phase, and finally and most importantly these crops are the major, cheap and sustainable source of nutrition for the masses, besides improving the environment¹².

Future demands and challenges

Horticulture crops are going to hold the centre- stage in the agricultural policies of the country as long as the national economy is agrarian as it is today, accounting for over 30 per cent of the country's GDP (computed on the current prices), the highest from any other major economic activity¹¹. These crops have the potential to make a substantial contribution to it, much more than at present, for the reasons explained earlier in this paper. Their role in improving the health standards and arrest the deterioration in the environment will further add to their importance. The country would need at least 45 million tons of fruits and 115 million tons of vegetables to meet the daily requirements of 1 billion population of 2000, exports and processing after making allowance for the handling and physiological losses common to these commodities during post harvest stages. This demand could go up to 50 and 130 million tons respectively by 2006 for an estimated population of 1094 million. Similar projections have been made for other commodities namely coconut, cashew, spices etc.

The above demands will have to be met both by horizontal (expansion in the area) and vertical (increase in productivity of individual crops) growths in the coming years. The former approach will contribute about 30 per cent of the additions required, and can be achieved through utilisation of wastelands and diversion of the land in the dry land, arid, coastal and hilly zones which are presently lying fallow, or are under subsistence farming of cereals etc., characterised by low yields and poor returns. The apprehension normally voiced against the growth of these crops at the cost of the area presently under food grain crops is misplaced, as these will not encroach upon the prime irrigated areas which constitute the backbone of the food grain production in the country. On the other hand, substantial part of increment in the total production could have to be derived through the latter option, scope for which is unlimited. Although the productivity levels of late have improved, as stated earlier, there is appreciable gap to be bridged to reach the optimum levels. Bulk of the existing perennial plantations/orchards are mostly senile/old and diseased, adversely affecting the national averages of yields per hectare, and at the same time are occupying lands in prime locations. Majority of these can be easily revived through appropriate rejuvenation practices to develop them into sustainable production units. Others would have to be uprooted to make way for new plantings of improved cultivars. Similarly, in the case of annual crops, such as vegetables fruits, use of high yielding varieties/hybrids would have to be resorted to extensively.

The above strategy can bear desired results only if the supply of quality planting and seed material of improved cultivars/ hybrids is organised on a priority basis. The demand is estimated to be 1400 million saplings of tree crops by 2002¹³, and would definitely lead to

mushrooming of private nurseries without any check in the absence of an effective Nursery Registration Act in each state and UT, and enforcement of nursery plant certification provisions of the Seed Act of GOI. In vegetables, although private sector has been playing a major role in production and distribution of seeds, yet bulk of the material available in the markets is from the unorganised sector trading in uncertified seeds, while the hybrid seed is mostly with the corporate units. It is the former which needs to be harnessed to get involved in production and marketing of duly certified materials, and at the same time enforcement of quality standards needs to be carried out with better reach and teeth, if India has to compete in the world market.

Post harvest losses presently in the range of 20 to 30 per cent, which contribute directly to the reduction in the availability of these commodities to the people, and estimated to cost Rs.23, 000 crores, are the other major constraint in achieving the goals ¹⁴. This is primarily due to very weak infrastructure available for post harvests handling, lack of appropriate technology for on-farm adoption and unorganised marketing practices in vogue. These in turn contribute to the high retail prices of these commodities, thus making these unaffordable to the ordinary consumers, and silently contributing to the nutritional disorders, particularly in the economically weaker section of the society.

Meeting the future challenge would call for a major reorientation in the R&D strategies of the central and state governments at the earliest. Research has to demand-driven and need based, and, therefore, priorities would have to be fixed based on the needs of farmers/producers/entrepreneurs/consumers rather than scientists' own perceptions.

White Revolution

India's White Revolution, which has quietly swept the country during the past few decades deserves attention equal to that given the better-known Green Revolution. The White Revolution holds the promise of raising the nutritional status of underprivileged sections of our people. With a production forecast of 74 million tonnes in 1998/99, India has become the largest milk producer in the world.

In 1998-99, India is estimated to have produced 74.3 million tonnes of milk (equivalent to 203.5 million litres per day) compared to 16 million tonnes at the time of independence and 20 million tonnes at the commencement of Operation Flood (OF) in 1965. This milk was produced by 70 million dairy farmers from a milch herd comprised of 57 million cows (31 millions in milk) and 39 million buffaloes (25 million in milk) with an average milk yield of 1,250 kg. Almost the entire quantity (98%) was produced in the rural sector. Only 10 percent of the milk produced (20 million litres per day) was processed in dairy plants. The value of the output of the dairy plants was Rs. 105,000 crores. The per capita availability of milk rose from 132 g/day in 1950-51 to an estimated 214 g/day in 1997-98 despite a large increase in population ¹⁵.

Of the liquid milk consumed in India, a substantial part is used for whitening coffee or tea. For the economically weaker sections, this use accounts for almost all milk consumed. The fat content of milk is not of much consequence for this usage, hence the sizable demand for lower cost toned and double-toned milks.

Operation Flood has been one of the largest and most successful rural employment schemes in the world. Cooperative dairying means regular income to lakhs and lakhs of small farmers. Cooperative dairying has not been merely the modernisation of milk production but has larger technological, economic and social dimensions. It has created and nurtured democratic structures at grass root levels. Such gains should not be endangered. Above all, the future of India's dairy farmer is a trust that each of us holds. We cannot and must not let them down.

It is a fact that India is the largest milk producer in the world. But it is equally true that India is not self sufficient in milk consumption. The present consumption is at the per capita rate of 206 grams per day, which is below the minimum standards prescribed by the Indian Council of Medical Research, and much below the per capita consumption in other countries. The world average of per capita consumption is 300 grams per day. It is true that the per capita consumption has doubled from 100 grams at the time of independence to the present level. If India's consumers were to have a consumption of milk above the ICMR recommended rate of 220 grams per day and if the consumers were to include the 53% malnourished children, India's need for milk would be much greater - at least 150% of today's consumption - i.e. 110 million tonnes. Further, the demand for milk is bound to go up with growth in income of the poor, as high as 173 million tonnes per year by 2020 ¹⁶.

In the traditional context, three cumulative factors have been restricting the opportunities for raising milk production. First of all, the crucial importance of animal draught power in the rural economy tends to make the bullock a more productive animal for the farmer than the buffalo. Secondly, due to high human densities in India, there is chronic scarcity of feed resources. In combination with the first factor, this leads to an allocation of resources in favour of draught animals, which leaves little quality feed for milk production. Thirdly, even though there are some excellent specialized breeds of buffaloes and cattle, an average low quality of animal stock in terms of milk productivity has been a constraint in increasing milk production. The productivity per animal in India (1,250 kg/lactation) is still very poor compared in to international levels (2,038 kg/lactation) due to gradual breed deterioration. The majority of Indian bovines, are of a non-descript type, while the ban on cow slaughter hampers the possibility of culling non-productive stock

ENSURING EQUITABLE DISTRIBUTION

Achievement of food adequacy at the national level is a condition, necessary but not sufficient in itself, to ensure the achievement of household nutrition security. For example, India has today built up fairly adequate buffer stocks of food grains, but it is still the case, that nearly a third of households in the country do not enjoy full nutrition security. Buffer stocks do help to combat acute transient food scarcity, caused by natural disasters like floods and droughts. These acute disasters are, no doubt, now being handled more expeditiously and efficiently than in the past, and several lives are being saved by timely action. Early warning systems are in place and food can be rushed to areas of threatened distress fairly rapidly. What is proving more difficult, however is the task of combating chronic mild / moderate undernutrition in large number of poor households, in normal "peace-time".

Eradication of Poverty:

Lack of nutrition security in the ultimate analysis, is but a manifestation of the poverty syndrome, the mutually reinforcing attributes of which are: (a) poor vocational skills and consequent poor family income, (b) poor housing and environmental sanitation, (c) poor access to basic health services, and (d) lack of self-esteem and consequent poor motivation for individual or collective action for socio-economic advancement. Considerable proportions of populations of developing countries are now caught in the 'poverty trap': Nutrition Security will become possible only if these communities are enabled to liberate themselves from it. Durable, sustainable nutrition security cannot be achieved unless these mutually synergic factors of the "Poverty Syndrome" are collectively addressed, and unless there is a convergence of programmes designed to address each of its components. Narrow vertical programmes, which mainly address just a symptom of the poverty syndrome, can only help mitigate undernutrition for the time being.

India had undertaken large-scale supplementary feeding programmes targetted to children of poor communities. These are expensive programmes, in which generally less than 40% of the expense incurred actually go to benefit the children; often the programmes are not effectively targeted (for example, children below 3 years of age, who may be considered more vulnerable are not reached). It is true that the children actually reached at least get almost a third of their daily nutrition requirement and for population groups in dire poverty this could be an important contribution. But unless the programme is wisely used along with other efforts, as an 'entry point' to facilitate an ascending spiral of development in the community, no lasting benefit will be achieved. Free give-away programmes are the least cost-effective way of achieving nutrition security. They can only be justified as temporary relief operations in regions and seasons of dire poverty and food scarcity.

The supplementary feeding programme undertaken as part of the Tamil Nadu Integrated Nutrition Project of the World Bank in South India, was targeted well to reach children of poor communities and was associated with programmes of education of the mothers in appropriate child-rearing practices. Despite its limited success and its usefulness as a demonstration, a programme of this nature is not to be looked upon as the lasting solution. In the Integrated Child Development Service (ICDS) in India, supplementary feeding programmes succeed only in reaching children beyond 3 years of age, and is targeted. While in ICDS areas there may be improved immunisation coverage, it has failed to make a dent on the persisting problem of low birth weights largely because pregnant women and adolescent girls were not effectively covered. By and large, strategies that help the community to help itself are the ones that are likely to succeed eventually and contribute to promote self-reliance and lasting nutritional upliftment.

Experience of the last 50 years has shown that severe forms of malnutrition once rampant have now been largely eliminated in most Asian countries, not because of narrow vertical 'nutrition intervention' programmes but because of all-round socio-economic development, however slow. While well-targeted supplementary feeding programmes may be necessary as a relief operation in special situations, they cannot be the durable strategy for nutrition security. There may be a temptation to use large-scale supplementary feeding give away programmes as soft populist options for narrow political gains. Investments on essential

infrastructure, roads, improved communications, basic health services and facilities for schooling and vocational training for the poor may yield long term benefits. Where supplementary feeding programmes are resorted to in special situations, they must be part of an integrated effort aimed at all round improvement of the community.

The Public Distribution System (PDS):

PDS has been looked upon as a major instrument for ensuring equity in the matter of food distribution. It provides access to food at reasonable prices. While the system is important, it will be wrong to expect that by itself it will lead to achievement of nutrition security in poor households. Firstly, the system has to be specially targeted to populations identified to be poor. The criteria for poverty that will entitle people to the PDS service need to be defined and strictly applied. This has not always been done. Secondly, in rural areas, agricultural labourers and small landholders are "eating off the land" and their food consumption figures are not reflected in market transactions. It is for these reasons that in India, the offtake of food grains from the country-wide PDS system represents only a small fraction of the total food grains calculated to be actually consumed by the poor¹⁷. On the other hand, PDS may be of more direct benefit to the urban poor. Despite its limitations, PDS well targeted to the poor is an important facility that can contribute to nutrition security.

The Problem of Urbanisation:

The ongoing rapid urbanisation is adding an important new dimension to the problem of ensuring house-hold nutrition security. In India, for example, as against 15% of the population which was urban 50 years ago, it is estimated that within the first decade of the next century this figure could reach 40%; nearly a third of this urban population will be constituted by the poor, inhabiting the slums. Unlike the rural poor who are largely agricultural labourers, the urban poor generally belong to the unorganised urban labour sector with entirely different occupation patterns. Steps for the achievement of nutrition security in urban poor households could therefore differ from those that may be appropriate for the rural poor.

Since it is often the young adults from the rural areas that migrate to towns, leaving behind their old parents and grandparents, health /nutrition problems of the aged and destitutes in rural areas, could gain increasing importance. Since the longevity of women exceeds that of men, many rural households in rural areas are already being headed by single old women, and women could be the major sufferers. Indeed nutrition security for the aged will become an increasingly important problem in developing countries, in the next century.

Despite these deleterious repercussions, urbanisation is a catalyst for change. It brings the poor and rich into close geographic juxtaposition; this together with the proliferation of televisions is already leading to increasing awareness on the part of the poor, of the enormity of their deprivation. Since the urban poor often commute to their erstwhile rural homes periodically, this awareness is not confined to the urban poor. It is also the case that a considerable proportion of the erstwhile urban poor who had migrated from their rural homes have now managed to ascend the socio-economic scale and to become part of an expanding (neo-rich, first generation) affluent middle class. It is estimated that in India, the population

belonging to this urban middle class may now exceed 200 million (more than 12 times the population of Australia). While this situation may seem explosive, it also provides a climate for change. It will be wise strategy to use this favourable climate, to bring about peaceful change for the better, and to avoid social unrest.

As was pointed out earlier, the problems of the urban poor are somewhat different from those of their rural counterparts. The urban poor usually belong to the unorganised labour sector. In many poor urban households, not only men but also women go out to work; under these circumstances, exclusive breastfeeding for about four months of infancy which is the common practise in rural areas is not possible under urban conditions. Women, belonging as they do, to the unorganised labour sector do not enjoy maternity benefits. Urbanisation thus poses a serious threat to breast-feeding and infant nutrition. Facilities of day-care centres where infants and young children can be looked after are generally not available. This situation needs to be corrected.

Ready-to-eat foods and street foods are coming into increasing use in urban areas. The study on street foods carried out in Calcutta provided useful leads. Street foods are relatively inexpensive and are generally in conformity with the local cultural dietary practices; and if hot and fresh, possibilities of microbial contamination are reduced. In countries like Thailand, Myanmar, Bangladesh and India, street foods based on traditional diets, are currently in wide use. Through training of the vendors in the observance of strict personal hygiene and care in food handling, street foods could be made safer. These could continue to make some useful relatively inexpensive contributions to nutrition security in the urban slums. On the other hand fashionable fast-food units now springing up in large cities, largely modelled on western lines are unlikely to make significant contributions towards nutrition security of the poor.

The Significance of Female Literacy:

Of the many shackles, which account for our current state of under-development and under-nutrition, perhaps the most important is female-illiteracy. The important link between female literacy and house-hold nutrition security will be revealed by data in table-II; which show a close correlation between the level of female literacy in a country on the one hand and child mortality and the nutrition status of its children on the other. The relationship between the level of female literacy in a society and its health / nutrition status will be strikingly seen in the data from six states of the Indian union presented in table-III. India is a vast country and 'average figures' for the whole country do not convey much meaning. Disaggregated data presented in the Table-III, seek to compare four of the most 'backward' states of the country with two of the most 'forward'. From the point of view of natural resources and per capita availability of food, the two 'forward' states are certainly no better off than the four 'backward' states in the table. The striking difference with respect to fertility, infant and child mortality and child nutrition between these two sets of states will indicate the enormous importance of the level of female education as being a major determinant of health/nutrition status of developing societies.

How does the educational level of women influence the nutrition status of their children and household nutrition security? The relationship between female literacy on the one hand and household nutrition security on the other is not necessarily a 'cause and effect'

relationship but an association. Improved level of female education may be expected to be reflected in nutritional status of households in several ways like- ensuring physiological intra-familial distribution of food, prevention and control of infections, better access to reproductive health and other National programmes.

Faulty Intra-Familial Food Distribution:

The availability of adequate food at the household level does not necessarily imply that the food is distributed to members according to physiological needs. The worst sufferers in this regard especially in households with marginally adequate food supply, are women (especially pregnant women) and children or infants; the male wage earner gets the lion's share. The extra food needed to meet the food and nutritional requirements of women and especially children generally constitutes a small fraction of the total food already available for the household. Faulty intra-familial distribution of food, and faulty choice of foods contribute to a considerable part of undernutrition in children and women in poor households. Much of the mild/ moderate malnutrition in children of poor communities is directly attributable to poor infant and child feeding practices, due not to lack of food in the household but to lack of/ faulty child-rearing trends. Significantly, a good part the high incidence of low birth weight deliveries in poor communities is also attributable to lack of awareness of the special nutrient needs of women during pregnancy. This is an area in which nutrition education can make a significant contribution, even in the context of poverty.

Importance of Basic Health Services, Safe Water Supply and Personal Hygiene:

Much of the undernutrition currently prevalent in children of developing countries is attributable to conditioned malnutrition, arising from infections. Diarrhoeas and respiratory diseases, largely attributable to poor environment and lack of personal hygiene, are now contributing heavily to child morbidity and undernutrition in millions of poor households in developing countries. Improvement of environmental sanitation, provision of safe drinking water and observance of personal hygiene will make important contributions to nutrition security in poor communities. Prompt and appropriate treatment can help to considerably reduce morbidity; in the absence of adequate access to appropriate health facilities this becomes impossible. Safe water supply, good environment and personal hygiene and basic health care may make as much, and perhaps even greater, contribution to nutrition security in poor communities than supplementary feeding programmes pursued in the continuing context of poor sanitation, poor health care and poor personal hygiene. Improvement in basic health services has to be accorded high priority in any programme of development addressed to poor communities.

The Adolescent Girl

For over 15 years, I have been earnestly pleading for a special focus on adolescent girls of poor communities in our health/nutrition/development programmes^{18,19,20}. Most of these girls drop out of schools after the first few years of schooling and are engaged in minor chores in their houses helping their parents; and waiting, as it were, for menarche to arrive. Invariably thereafter, they are 'trapped' into marriage and start their reproductive lives. These are the Mothers-to-be, a crucial segment of the population, who will not only usher in the next

Table - 1.5
Food Share : 1956-57 to 1997-98

			(Percent)	
S.No	NSS Round	Period	Rural	Urban
1.	12th	March, 1957 to August, 1957	70.3	58.4
2.	13th	Sept. 1957 to May 1958	68.3	59.9
3.	14th	July, 1958 to June, 1959	69.3	60.3
4.	15th	July, 1959 to June, 1960	68.1	61.0
5.	16th	July, 1960 to Aug., 1961	67.9	60.9
6.	17th	sept., 1961 to July, 1962	68.8	60.2
7.	18th	Feb., 1963 to Jan., 1964	70.1	59.6
8.	20th	July, 1965 to June, 1966	74.0	63.8
9.	21st	July, 1966 to June, 1967	76.3	65.8
10.	22nd	July, 1967 to June, 1968	77.4	66.5
11.	23rd	July, 1967 to June, 1968	74.4	66.4
12.	24th	July, 1967 to June, 1968	73.8	65.7
13.	25th	July, 1967 to June, 1968	73.6	64.4
14.	27th	Oct., 1972 to sept., 1973	72.7	64.4
15.	28th	Oct., 1973 to Jan., 1974	75.0	67.1
16.	32nd	July, 1977 to June, 1978	63.9	54.2
17.	38th	Jan., 1983 to Dec., 1983	65.6	59.1
18.	42nd	July, 1986 to June, 1987	65.6	57.9
19.	43rd	July, 1987 to June, 1988	63.3	56.0
20.	44th	July, 1988 to June, 1989	63.5	57.8
21.	45th	July, 1989 to June, 1990	64.3	55.5
22.	46th	July, 1990 to June, 1991	66.0	56.9
23.	47th	July, 1991 to Dec., 1991	63.1	56.1
24.	48th	Jan., 1992 to Dec., 1992	65.0	56.1
25.	49th	Jan., 1993 to June, 1993	65.2	57.7
26.	50th	July, 1993 to June, 1994	63.2	54.6
27.	51st	July, 1994 to June, 1995	61.0	53.2
28.	52nd	July, 1995 to June, 1996	60.4	50.1
29.	53rd	Jan., 1997 to Dec. 1997	58.7	49.6

The recent decision by the Government of India to award attractive stipends to the girl child of poor communities for schooling, is an imaginative step in the right direction. What is particularly attractive about this programme is that the level of stipends is to be progressively increased with stages of schooling. This could discourage school dropouts. On the other hand, this step by itself cannot lead to a significant impact of female literacy, unless parallel efforts are made to improve school education at the secondary and high school levels. Even, the rural school should impart computer and internet education at the secondary and high-school levels. This may seem a tall order at the present stage, but unless adequate investments in the upgradation and modernisation of school education in these directions are made, developing countries will not be able to make rapid progress in the next two decades.

Improving Income-Generating Vocational Skills

In the next century, brain rather than brawn will play the determining role in ensuring the quality of Human Resources of a country. Tomorrow's societies will be 'knowledge societies', and only those endowed with skills will be able to effectively participate and benefit from 'development'; others will be left behind. New communication and computing techniques will exert profound impact not just on research but on daily activities and seemingly routine occupations. What is needed in this emerging situation is not just literacy, but the acquisition of vocational skills on the part of not just men but of women as well. It is through the imparting of vocational skills that we can raise the income-generating capacity of the poor and thus ensure for their nutrition security as part of improved quality of life. Indeed female education and the empowerment of youth with knowledge and skills could be the best means to bring about desirable nutrition and national security. The task of raising literacy level in developing countries is formidable; but this major challenge must be squarely met.

Mobilising and Empowering the Community

The experience of the last few decades shows clearly that the main focus in programmes designed to bring about nutritional upliftment must shift from the provider (the government) to the consumer (people). For too long, community development/nutrition programmes have been conducted as bureaucratic operations with the community being treated as a passive (and hopefully grateful) receiver of doles and services being handed to it by the government. This has led to lack of accountability and achievement audit and has damaged self reliance and self esteem. The psychological distance between the provider and consumer has widened; a passive community often blames the government for not doing enough for it and an arrogant bureaucracy often blames the community for its ignorance and non-co-operation. The time for change has now arrived. The confusion as to what constitutes the "Centre" and what constitutes the "Periphery" must now change. The Centre is not the Government in the distant (geographically and psychological terms) capital cities, but is very much in the villages where the real action lies. The bureaucrats are the back-room boys and it is the community that must now be in the driving seat. Once this attitudinal change is accepted, the community can be encouraged and equipped to assume its leadership role. The government's role should be limited to providing such resources as will be needed to facilitate community action.

Programmes designed to bring about nutritional upliftment involving such community based activities like home gardening and nutrition education can be successfully organised and implemented by village level community organisations using trained local volunteers drawn entirely from the community, generating and using local food resources. By utilising, training and effectively channelling the immense potential of local communities, and by wise utilisation of local food resources considerable success can be achieved in the matter of ensuring household nutrition security. The active participation of the community will enhance its self-reliance and self-esteem and will be conducive to its all-round development.

Equipping people for the Knowledge Societies of tomorrow:

The emerging societies of tomorrow will be 'Knowledge Societies'. Brain rather than brawn will be the major determinant of the quality of the human resources and of our place in the world development scale. We should therefore be concerned with the state of Mental Development of our children- our future citizens. Physical stunting in poor communities is invariably associated with mental stunting as well. Aggarwal ²³ has found that children in poor communities had an average IQ of 89 as against an average IQ of 98 in normally nourished children. The prospects of a child in poor communities ending up with IQ of less than 90 were shown to be 3.5 times higher than in the case of children of high-income groups.

The development of the brain is not complete at the time of birth. Several thousands of synaptic connections which determine ultimate brain function take place in the post natal an early childhood periods. Through providing proper stimulation and home environment, an educated mother can significantly promote the brain growth and mental development of her offspring during infancy and early childhood even in the context of poverty. This is apart from character formation, a process which can extend to late childhood as well.

The studies of McGregor ²⁴ had shown that with nutrition supplementation and stimulation, mental deficits in stunted children can be significantly overcome. In fact her studies show that even with stimulation alone, even in the absence of nutrition supplementation, mental development could be enhanced. We cannot depend on schools to provide stimulation because it is in the preschool period just before 3 years of age, that most of the post-natal brain development takes place. A rise in 10 points of IQ could mean the difference between the child 'ending as a Harvard Don or a janitor'.

India's strength will ultimately depend on its intellectual capital. Mothers can contribute greatly to the augmentation of India's intellectual capital only when they are themselves educated and not subjected to the social shackles which today stand in the way of their full development.

Table I

India's Current Position in Agricultural production

Crop	Area (1,000 hectare)		Production (million tones)		Productivity (kg/hectare)	
	India	Highest	India	Highest	India	Highest
Wheat	25122 (3)	China 29001	72.0 (2)	China 109.005	2493 (32)	Ireland 8997
Rice	42700 (1)	India	82.2 (2)	China 190.100	2811 (51)	Ukraine 7444
Maize	6150 (5)	USA 29602	8.66* (9)	USA 236.604	1408 (105)	UAE 18636
Sorghum	11700 (1)	India	10.50* (2)	USA 20.39	897 (51)	France 6182
Potato	1089 (3)	China 3502	17.94* (6)	China 46.05	16478 (51)	Ukraine 43966
Pulses	25604 (1)	India	14.8 (1)	India	608 (119)	France 4769
Cotton	8300 (1)	India	14.0 (3)	China 18.75	922 (57)	Israel 4527
Sugarcane	3870 (2)	Brazil 4826	289.7 (2)	Brazil 324.435	65892 (34)	Peru 121361

- ❖ *Production figures for India are 1998-99 estimates taken from the Economic Survey. For the rest of the world, production figures correspond to the year 1996
- ❖ Figures pertaining to productivity and area correspond to the year 1996. Figures in parenthesis indicate rank
- ❖ 1996 production figures used for those items.

Source: Swaminathan, M.S. Towards an evergreen revolution in Agriculture. NFI Bulletin, 20(2): 1-4, 2000

Table-II
Comparison of Female Literacy with Under-5 Mortality Rate and Percentage of Low Birth Weight.

Country	Female Literacy (1995)	Under-5 Mortality Rate (1997)	Low Birth Weight(%) (1997)
Philippines	94	41	9
Thailand	92	38	6
Vietnam	91	43	17
Sri Lanka	87	19	25
Singapore	86	4	7
Malaysia	78	11	8
Indonesia	78	68	8
Myanmar	78	114	24
China	73	47	9
India	38	108	33
Pakistan	24	136	25
Bhutan	28	121	-
Bangladesh	26	109	50
Nepal	14	104	-

Source: State of the World Children 1999, UNICEF 1999.

Table-III
Relationship of Female Literacy with Health and Nutrition Status.

State	Female Literacy (%)	Total Fertility Rate	Infant Mortality Rate	Under-5 Mortality Rate	Stunted (%)	Under-weight (%)
Bihar	29.6	4.0	89.2	127.5	60.9	62.6
MP	34.3	3.9	85.2	130.3	NA	57.4
Rajasthan	25.4	3.6	72.6	102.6	43.1	41.6
UP	31.5	4.8	99.9	141.3	59.5	59.0
Kerala	82.5	2.0	23.8	32.0	27.4	28.5
Goa	72.9	1.9	31.9	38.9	32.5	35.0

Source: National Family Health Survey 1992-93.

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POPULATION GROWTH AND ITS IMPLICATIONS IN SCHOOL EDUCATION

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India is the second most populous country of the world. It is also densely populated. In just only 2.4% of the total world land area, India supports approximately 16% of the world population. In other words, the density of population of India is 6.7 times that of the world density.

Population of India remained stationary for several centuries before 1600 A.D. Thereafter, the population started increasing. (Saroj Yadav, 1988) However in the decade 1911-1921 there was a decrease. From the decade 1921-1931, there has been a steady increase in the rate of growth till the decade 1961-71 when the increase in rate of growth came to a halt. Thereafter, the rate of growth started decreasing. The population growth between 1901 and 1991 is shown in Table-I. (8th Five year Plan Document of Government of India). In 1996, a Technical Group on Population Projections constituted by the Planning Commission gave its projections for the period 1991-2016.

The predicted projections are given in Table-II. It may be seen from Table-I that the growth rate was only 1.25% per annum during the decade 1941-51. The annual growth rate increased rapidly to 1.96 in the next decade and to 2.20 in the decade 1961-71. Thereafter it almost leveled off and then started decreasing. From 1958, the Planning Commission has been basing its plan proposals on population projection estimated by expert groups. The State Governments and the union Government have also been popularising family planning for several decades now in order to contain the rate of population growth. The seventh plan document assessed the growth rate at 2.1% per annum during 1981-86 and projected the growth rate for 1986-91 at 1.9%. But according to the census for 1991, the growth rate was 2.1% per annum for the entire decade.

In other words both the sixth and seventh plans have fallen short of achieving the targets set for reducing the rate of growth of population. However during the eighth plan period not only there has been considerable refinement in the methodology adopted for projections but also the family planning efforts became more effective. Thus the projections made in 1988 for the year 1991 was 843.6 million and the census report gave the figure as 846.3 million.

According to the 8th plan document the Indian population will grow from 844 million in 1991 to 925 million in 1996, 1006 million in 2001, 1086 million in 2006. The net reproduction rate (NRR) will equal unity during the period 2011-16. This is five years later than what was predicted at the time of the preparation of the seventh plan. The document also states that even though NRR may be achieved before 2016, the population will stabilise only at the end of the 21st century!

It is gratifying to note that the annual population growth rate has already fallen below 2%. If only India had succeeded in 1951 to contain the rate of growth of population and reduced the rate to 1%, the advantages that would have accrued can be imagined!

DEMOGRAPHIC TRANSITION

In general the demographic transition is known to occur as follows: in the first phase there is a fall in death rate and people live longer leading to growth of population; in the next phase there is a fall in the birth rate; but the fall in birthrate is less steep than the fall in death rate and hence the population continuous to grow; in the third phase death rate remains stationary and replacement rate of fertility is attained; but yet the population continuous to

grow as the population in the reproductive age group is large; in the last phase the birth rate falls further and the population stabilizes. In some societies the birth rate may continue to fall further and the population may decrease. Different countries of the world are in different phases. India is still in the second phase. According to the 8th plan document India may reach the third phase in 2016.

As already observed the rate of growth of population is a function of birth rate and death rate. The birth and death rates for India are given in Table-III.

The Table-III clearly reveals that India was in the first stage of demographic transition during 1891-1921 and is in second phase from 1921 onwards. The more recent trend indicates that India will enter in the near future the third phase. However as per the working paper of the Planning Commission on Population growth (Prema Ramachandran et al, 2000), there are substantial differences in the performance of States in respect of the family welfare scheme. Though the birth rate and infant mortality rate have decreased in all States, the rate of decline is slower in some States. The birth and death rates for the major States for the year 1996 are shown in Table-IV. (Government of India 1997). The data indicate that Kerala and Tamilnadu have achieved a birth rate of less than 20; Andhra Pradesh, Maharashtra, Karnataka, West Bengal, Punjab, Orissa, Gujarat and Haryana have achieved - birth rate of less than 30. As against these, Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh continue to have a very high birth rate. These States which are way behind the other States, account for 44% of the Indian population. Therefore, India as a whole may not be able to move in the near future from phase 2 to phase 3 in the demographic transition, unless some special steps are taken to effectively implement early the family welfare programme in Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh.

Age Composition

The study of age composition is necessary to determine the strategy to be adopted for planning to meet the needs and aspirations of different age groups. The trend in the growth of the population in the age group 0 to 14 will indicate the strategy for achieving the targets for school education. Between 1911 and 1971 the percentage of population in the age group of 0-14 increased from 38.8 to 41.4. The distribution of age groups after 1971 and the anticipated trends are indicated in Table-V.

The Ninth Plan document indicated that the population in the age group of less than 15 years will only marginally decrease from 352.7 millions in 1996 to 350.4 millions in 2016, even though the percentage of this population might fall steeply to 27.30. The Ninth Plan document envisages that the focus will be to improved access to education and skill development apart from the improvement in the quality and coverage of health and nutritional services.

POPULATION POLICY

The significance of the growth of population on all planning activities can be judged from the fact that during a period of ten years between 1981 and 1991, there has been an increase of more than 16 crores of Indians. The enormity of this figure can be realised by comparing this figures with the populations of Canada and Australia, which are 2.7 crores and 1.68 crores respectively in 1990 i.e. about one Australia was added every year between 1981 and 1991 or more than 5 ½ Canadas were added in the same period. Realising the enormity of the problem, India recognised the necessity for family planning even in 1952.

But unfortunately upto the last plan i.e., 8th plan, India had not been able to achieve the targeted birth rates. Even though the 8th plan targeted that by 1997, the birth rate will fall to 26.7, the actual achievement is only 27.4. In view of this, taking into consideration the trends and achievements the expert group in 1996 stated in its report as follows: Between the periods 1996-2001 to 2011-2016, there will be a decline of birth rate from 24.10 to 21.41, death rate from 8.99 to 7.48, thus leading to decline of natural growth rate from 1.51% to 1.39% i.e., there is a hope that for the country as a whole, the replacement level total fertility rate (TFR) of 2.1 may be reached by 2016. But even at that time the projected TFR will not be 2.1 for some States taken individually. Projected levels of TFR for the major States and India, during 1996-2016 are given in Table-VI. From the estimates provided by the technical group, the probable years by which the replacement level of TFR of 2.1 will be reached by different States are indicated in Table -VII.

From the Table-VII, it may be seen that Kerala and Tamil Nadu have already achieved TFR of 2.1 and may be classified as group I States. The second group consisting of Andhra Pradesh, Maharashtra, Karnataka, West Bengal and Orissa may achieve TFR of 2.1 by 2010. Group III comprises of Gujarat and Assam which States are likely to achieve the target by 2015. It is the group IV comprising Punjab, Haryana, Rajasthan, Madhya Pradesh and Uttar Pradesh accounting for 44.5% of the total population of India which may achieve the desired TFR only after 2016. Madhya Pradesh with 8% of the population may achieve in 2060 and Uttar Pradesh with 16.8% of the population may achieve only after 2100. The estimated total population and Annual Average Growth rates (1996-2016) are given in Table VIII.

Realising the gravity of the situation, the Government of India has come up with the National Population Policy 2000. Even though in the half a century after formulating the national family welfare programme, significant progress has been made in reducing birth rate, infant mortality rate, death rate and total fertility rate, improvement in the couple protection rate, life expectancy and achieving nearly universal awareness of the need for and methods of family planning, it is now proposed that TFR is to be brought to 2.1 by 2010 and a stable population to be attained by 2045. If TFR of 2.1 is achieved by 2010, the expected population will be 1107 million instead of 1162.3 million when the birth rate will be 21.

The National Population Policy 2000 divides the States into three groups according to the TFR of the State in 1997. The population profile of all the States are given in Tables-IX, X and XI. These Tables clearly indicate the striking diversity. It is seen that TFR is as low as 1 in Goa and as high as 4.8 in Uttar Pradesh. Therefore, the type of problems that may come up in achieving the targets and the type of strategies and programmes needed may vary very widely from State to State. The issues may have to be approached in this light.

EDUCATION

The Ninth Plan document states that Education is the most crucial investment in human development. The Prime Minister's Special Action Plan has identified the expansion and improvement of social infrastructure in education as a critical area. The National Agenda for Governance states: "We are committed to a total eradication of illiteracy. We will formulate and implement plans to gradually increase the governmental and non-governmental spending on education upto 6% of the GDP, this to provide education for all. We will implement the constitutional provision of making primary education free and compulsory up to 5th standard. Our aim is to move towards equal access to and opportunity of educational standards upto the school-leaving stage. We shall strive to improve the quality of education at all levels – from primary schools to our universities". The Ninth Plan proposals have been formulated in the light of the foregoing observations.

Elementary Education

The following emerging factors have been taken into consideration in the formulation of the Ninth Plan for elementary education: “(i) the national goal of providing primary education as a universal basic service (ii) the Supreme Court judgement declaring education to be a fundamental right for children upto 14 years of age. (iii) the need to operationalise programmes through Panchayati Raj Institutions (PRIs) and Urban Local Bodies (ULBs), (iv) the legal embargo on child-labour. (v) the provisions of the Persons with Disabilities Act, 1995, and (vi) heightened awareness of human rights violations in respect of women, children and persons from disadvantaged sections of society.”

The crucial role of education was realised even when the first five year plan was formulated. In successive plans, efforts were taken to involve the people in the implementation of programmes; efforts were also taken to diversify educational programmes. These efforts have resulted in the creation of a vast education structure.

In the last fifty years since independence, the number of educational institutions has increased several fold as shown in Table-XII. The enrolment at the primary stage has increased from 19.2 million in 1950-51 to 110.40 million in 1996-97 and at the upper primary stage the enrolment increased from 3.1 million to 41.06 million. In other words the enrolment at the primary stage increased sevenfold from 22.3 million to 151.46 million. During the same period the number of teachers working in schools recorded a sixfold increase. As a consequence of the growth, primary schools are available within a km of the residence of children living in 83.4% of the rural habitations; and upper primary schools for 76.15% within a distance of 3 km. The total enrolment at primary stage during the period 50-51 to 96-97 increased by 5.75 times. At the upper primary stage, the increase during the same period is more than 13 times.

Universalisation of free education upto the age of 14, received a high priority in the Eighth Plan. The major effort was in the direction of reducing the disparities in access among various States and in different regions of the State, between boys and girls and among different sections of the society and in improving the retention and academic achievements of the children. With this object the following schemes were introduced or pursued: (i) Operation black board launched in 1987 was pursued in order to continue improving the infrastructure of schools. (ii) National programme of Nutritional support was launched in 1995 in order to provide adequate food grains to the school children. This scheme was targeted to cover 5.54 crore children by 1996-97. (iii) Minimum level of learning programme was introduced with the object of ensuring that all primary school children attain the specified competencies. This scheme has been launched in 12 States through 200 DIETs. (iv) District Primary Education Programme, partially funded by the World Bank in the form of a loan, was initiated in November 1994 in 42 districts of Assam, Haryana, Karnataka, Kerala, Maharastra, Tamil Nadu and Madhya Pradesh. It is being extended to other States also. Its concept is decentralised management, community mobilisation and contextual and research based inputs. (v) Bihar Education Project. This programme was launched in 1991. The project is funded jointly by the State Government, Union Government and UNICEF., and aims at qualitative and quantitative improvement of primary education. (vi) U.P. Basic Education Project. This project is being executed with a soft loan from International Development Agency and involves construction of class rooms and Block Resource centres, and training of teachers and (vii) The centrally sponsored scheme of reorganisation of teacher education was continued during the 8th plan. Till the end of 8th plan, 425 DIETs have been established, 108 training colleges have been upgraded and 5 university departments

are given special assistance. Orientation programmes have been organised and 4.5 lakh primary school teachers have been trained. A satellite-based interactive teacher orientation programme has been implemented on a trial basis in two States.

Secondary Education

During the last fifty years there has been a steady increase in enrolment in secondary schools. Enrolment has been steadily increasing in higher secondary level also from the time the 10+2+3 scheme was introduced. However, the percentage of children in the relevant age group pursuing education continues to be low. The disparities in percentage enrolment between urban and rural areas, tribal and other areas and boys and girls, persist. The education at the secondary level continues to be largely liberal in spite of the special efforts taken and investments made for vocationalisation.

According to the 9th plan document, the achievements during 8th plan in the field of secondary education are as follows: The number of secondary stage institutions (Classes IX-XII) increased from 84,076 in 1992-93 to 1,02,183 in 1996-97. The enrolment increased over the period from 20.71 million to 27.04 million. Girls constituted 36.2 per cent of the total students in 1996-97. The National Open School, which was set up in 1979 and converted into an autonomous organisation in 1989, offered foundation courses, secondary and senior secondary level courses, vocational and life enrichment courses. The number of subjects offered included 51 foundation courses and 23 secondary courses including vocational courses in the areas of Agriculture, Commerce and Business, Technology, Para-medical and Home Science. The number of study centres increased from 161 in 1990-91 to 666 in 1996-97. Of the latter, 105 are vocational study centres.

The Ninth Plan document proposes that the schools curricula may be revised to meet the work opportunities. Incentives are to be provided for girls and disadvantaged groups to pursue secondary education. Compensatory education will be provided for purposes of equity. Employment oriented vocational courses will be offered. The open learning system will be expanded providing for a wide variety of courses. Pre-service and in service training of teachers will be strengthened. Internet and computer facilities will be emphasized for all educational activities.

Vocationalisation of School Education

In order to guide the young ones towards useful vocational courses in which they may be truly interested and they may not drift into the general education programmes aimlessly and to prepare them for self-reliance and gainful employment it was proposed that vocational education be made a component of school curriculum. Vocationalisation is intended to fulfill the national goals of development, remove unemployment and bestow prosperity to the individual.

The necessity for vocationalisation at the appropriate stage of school education and inclusion of work experience or socially useful productive work at the primary school itself has been realised for a long time. As early as 1854, Wood's dispatch highlighted occupational education. In 1948, Radhakrishnan Commission recommended that there is a need for vocational education in order to meet a variety of needs of our young men and women. In 1952, the Mudaliar Commission felt that at the end of a vocational school course, the student should be in a position if he/she so wishes to enter life and take up some vocation. As a result of these two recommendations a chain of multipurpose schools were established throughout the country.

Kothari Commission (1964-1966) pointed out that there is a meaningless rush to the college courses, and consequently the young ones with college education are entering a variety of occupations which do not require college education. It recommended two distinct streams at the +2 level i.e., academic and vocational and felt that 50% of the students may be diverted to the vocational stream. This recommendation was accepted by the Government in 1968 and it was emphasised that the vocational course will be a terminal course.

The concept of separating the students at the higher secondary stage as vocational and academic stream students was reiterated many times in subsequent years by policy resolutions by the Government of India. But all along, the possibility of change over to academic stream and continuation of studies at higher levels in the same vocation/profession were being discussed and provided for. For instance a bridge course was devised for the vocational stream students to pursue higher academic courses at the university; provisions have been made for vocational stream students to pursue polytechnic courses in the same field etc.

The National Policy on Education (NPE 1986) states as follows in respect of vocationalisation: "The introduction of systemic, well-planned and rigorously, implemented programme of vocational education is crucial in the proposed educational reorganization ... vocational education will be a distinct stream intended to prepare students for indentified vocations spanning several areas of activity". NPE 1986 expected that 25% of the higher secondary students will be in the vocational stream by 1995. The programme of action prepared by the Ministry of the Government of India in 1987 accepted the Kulandaiswamy report on vocationalisation. Kulandaiswamy report reviewed vocational education in the country and provided guidelines for the development of vocational courses. It formulated the concept of vocationalization at different levels and made recommendations for linkages required among different agencies offering vocational courses for promotion of vocationalization.

According to the 9th Plan document of the Government of India, by the end of 1995-96, vocationalization has been extended to 6476 out of 1,02,183 schools in the country. The intake capacity of the vocational courses is sufficient to divert 11.5% of the students to these courses. However only 4.8% was diverted, even though a pre-vocational training was also introduced at the secondary stage in 1993-94. It was felt that lack of industry-institute linkages and academic constraints were responsible for the nonfulfillment of the target of diverting atleast 25% of the students to vocational courses. The document proposes as follows in its action plan: "The scheme of vocationalisation of education at 10+2 stage will be restructured so as to provide employability to the target group. An empowered Committee representing the Government, industry and trade will be constituted to promote a meaningful partnership and better inter-departmental coordination. Vocational courses with strong linkages with industrial units will be encouraged".

It may be pertinent to point out here that the progress in vocationalisation has not been uniform throughout the country. As for instance, Tamilnadu State has introduced 66 vocational courses in 6 major areas in as many as 1389 out of 3157 of its higher secondary schools. Among the 7.15 lakh higher secondary students in the State, 1.23 lakh students (17.2%) are in vocational courses during the year 1999-2000.

FUTURE CHALLENGES

It is clear from the theories of demographic transition, that the school going age population may continue to increase even after the TFR of the population had reached the replacement level of 2.1. But later the number will come down. In the Indian context, it is now proposed that by 2010, the TFR will be brought down to 2.1. But each State is in a different level of development and is in a different stage of reaching the objective.

Based on the latest population policy, the States have been classified as those already reached the desired value of 2.1., those which have a TRF between 2.1 and 3.0 and those which have a TRF of more than 3. As the population policy aims at bringing down the TFRs of all the States to 2.1 by the year 2011, the nature of problems that may be met by group 2 (TFR 2.1 to 3.0) are likely to be different from those by group 3 (TFR>3.0). A study of the past trends indicates that the problems of group 3 States will be similar to Kerala which underwent a steep reduction in fertility rate and those of group 2 States may be similar to Tamilnadu which underwent a gradual reduction in fertility rate.

Kerala Experience

The rate of growth of population of Kerala started decreasing from the decade 1971-1981. The fall was quite steep as may be seen from Table-XIII. But the growth rate and density of population varies substantially from district to district. Those details are given in Table-XIV. The table indicates that within the State there is a wide variation in the percentage annual rate of growth from 0.56 to 2.89, the State average being 1.43!

A recent study by the Thiruvananthapuram Centre for Development Studies (Michael Tharakar P.K. and Navaneetham, K., 2000) indicates the following: It is argued that as the birth rate is declining, the school age population will be declining and hence the investment on elementary education is to be restricted. This study indicates that school going age population will fall by 3.29 lakhs between 1991 and 2001. However, during 2001 to 2006 there will be an increase of 2.37 lakhs; and during 2001 to 2011, the increase will be 1.54 lakhs. The effect of reduction in fertility rate will be felt in the true sense only after 2011. Therefore the buildup school space should not be diverted for other purposes; but is to be used for qualitative improvement of the school system. Further, the reduction in primary school enrolment should not be cited as a reason for reducing public investment. In the particularly educationally backward districts and communities, there may be demand for more seats even when the State as a whole has less number of school going children. Similarly there may be demand for more seats in higher classes i.e. the school going population may be redistributed agewise and areawise. Therefore, public investment is to be reoriented based of actual needs. New innovative organisational and resource saving or sharing methods like Parent Teacher Associations, decentralised management and community support are to be devised and adopted. "To close the schools purely on the basis of decelerating demographic trend will be counter productive to the nationally and internationally accepted objective of education for all".

Tamilnadu Experience

Tamilnadu has achieved the desirable TFR of 2.1 in 1993; but it continues to have an increase in the school going population. In order to provide elementary schools within a radius of one kilometer, in all hamlets with population more than 300, the State Government opened 312 new Schools in 1998-99 and 400 in 1999-2000. In its policy statement for 2000-2001 it is said that after ascertaining the status of the remaining few hamlets not covered so

far, schools will be provided wherever necessary. The policy statement also observes as follows: “The present standard of elementary education will continuously be upgraded by taking measures to improve the method of teaching, appointment of adequate teachers and giving suitable orientation training to the teachers for enhancing the skills of the students. To make learning a pleasant experience, basic amenities are very essential. Government aims to provide text books that are interesting and easy to learn and teaching materials to supplement the books for the use of teachers. The environment of the school plays an important role for imparting education. Top priority will be given to provide permanent buildings, drinking water, toilet facilities, sports materials, play ground etc., to the schools. The aim of the Government is to focus on weaker sections who deserve special attention. Special attention is given to Tribals in remote areas and for enrolling handicapped children in general educational institutions”.

In order to universalise primary education, a special scheme called ‘Elementary Education Movement’ was launched in 1999-2000. This scheme will be continued in the year 2000-2001 also. Apart from creating a congenial atmosphere for learning, awareness camps will be held, one month prior to opening of schools, to give publicity regarding the importance of Primary Education. With the cooperation of the local bodies, voluntary organisations and interested general public in the field of education, these camps will be utilised to enroll all children throughout the State. In order to make learning an interesting experience for school children, Government promotes learning through “Joyful Learning” method. Method of teaching through music, games etc., will be adopted, audio cassettes containing simple and joyful songs will be distributed through the Directorate of Teacher Education, Research and Training. Likewise, in addition to the broadcast of Primary Education lessons through Television, action will be taken to screen video cassettes which are useful to all students. Government attempts to create through various means an atmosphere, which is conducive for the girl students to continue in schools, without break.

UNIVERSALISATION OF ELEMENTARY EDUCATION

Primary education will be a major thrust area during the 9th Plan. The involvement of the local bodies in implementation of the scheme of universalisation of elementary education is a must in order to ensure its success. By the 73rd Amendment to the constitution the subject of school education has been transferred to the Panchayats. During the last several years, it is being increasingly realised that in order to achieve universalisation of elementary education, the participation of the public is to be ensured. This can best be achieved by involving the Panchayats in this noble effort. The State Governments have to be urged to effectively transfer the subject of elementary education to the local bodies and ensure their cooperation in extending quality elementary education to all.

PROBLEM OF DROPOUTS AND VOCATIONALISATION

At present the issues of universal enrolment, retention and vocationalisation are being tackled individually. But a closer look at these issues will show that they are inter-related. There are many reasons for not enrolling and not continuing to undergo the education. One of them which perhaps is not being given much attention is that many children who drop out, the parents of those children and many parents who do not send their children to school find and sincerely believe that the school education is irrelevant, not related to their life, needs and aspirations. The school curriculum is suitable only to those that wish to pursue higher education or to find work in offices. The curriculum is not relevant to those who wish to pursue other avocations. It is time the curriculum that is not relevant to those that are not

interested to become teachers, lawyers, engineers, doctors, managers and Government officers are not made compulsory for all children and they are allowed to study or practice what they wish to pursue even from a very early age. At present the subjects of study are common upto the 10th standard. An attempt can be made to provide alternatives even from the 6th standard. This will be an incentive to retain the students. The present practice of offering vocational programmes only at the 11th standard is bound to fail as all those who are interested in pursuing such vocational programmes have dropped out even in the 6th standard and they are finding other ways of leaning their vocation.

It is well known that if one has to become an expert in any particular art, he/she has to put in long years of practice. For example if one has to become a good dancer, he/she has to practice the same for several hours every day for several years. As such, in order to provide sufficient training to an individual to become an expert in a vocation, he/she has to learn the same from the early childhood. Therefore, one possible scheme of new syllabi at school level will be that the present bias towards academic learning may be given up and instead a number of topics including several vocations may be introduced even at the 6th standard. Only a portion of the present syllabi may be made compulsory for all. In the rest of the topics again some amount of socially useful productive work or vocational subjects may be made compulsory for all. Even though all the students may go through all the rest of the programme, a child need pass only a stipulated percentage of the subjects. A worthwhile proposition may be that compulsory academic work may be about 30%; compulsory vocational subject about 20%; the optional part may be about 50%. This optional part may consist of both academic as well as vocational subjects. Though children may attend all the subjects, they may be required to get a pass only in 50% of them depending upon their aptitude.

The cost of providing the vocational components can be minimized by a judicious combination of the following techniques: In isolated places, those vocations in which the local children are interested need alone be provided by employing part time teachers who may be qualified only in that art but may not possess any formal education; clustering of schools may be attempted where possible and resources may be shared; Ramamurti Committee recommendation of establishment of large educational complexes may be tried where possible and students in the tertiary level may be used as part time teachers in the schools.

At present, parents are not willing to put their children in vocational courses as higher education becomes closed to them. If this bar is removed and children are allowed to acquire knowledge in the required subjects at any stage of their educational career and shift from vocational to academic stream or from one vocation to another, there will be no fear in the minds of their parents about the future of their children. Such a situation will permit the fullest development of all the talents of all children.

There should also be provision for upward movement in the same vocation/profession, if one is qualified and competent. At present there is scope in engineering field for a trained craftsman to become a technician and for a technician to become an engineer, i.e., an I.T.I. certificate holder with experience can join a polytechnic and qualify for a diploma; a diploma holder with experience to join an engineering College and qualify for an engineering degree. Similar provisions may have to be made in other professional fields such as medicine and agriculture.

CONCLUSION

This study indicates that even if the country as a whole achieves the target of TFR= 2.1 by 2010, there may not be any immediate substantial reduction in the total school going population. Even in the States that have already achieved the target, the school going population will only marginally get reduced. Efforts may have to continue to increase the inputs for qualitative improvement of elementary education in the States, where TFR of 2.1 has already been attained. In the second group of States where TFR is now between 2.1 and 3, the strategy of Tamil Nadu for the year 2000-2001 may have to be followed. In the third group of States with TFR greater than 3.0, the strategy already outlined in the 9th Plan document may have to be pursued vigorously. As there are differences within the States, the strategy to be adopted may have to be suitably adjusted in each district depending upon its position in demographic transition. In addition, the reasons for dropouts may have to be analysed more critically and the vocationalisation may have to be introduced as early as possible so as to make the environment of the school as familiar and conducive as possible and the children may develop to the fullest extent all their talents. This will result not only in bringing about prosperity to the individuals but also in removing unemployment, reducing underemployment and overall development of the Country.

Table -I

DYNAMICS OF POPULATION GROWTH: 1901-1991

Period	Population at the end of the Period as on 1.3.2000		Growth Rate %		Vital Rates per 1000		
	Total	Urban(%) millions	Decadal	Annual (Exponential)	Birth Rate	Death Rate	Natural Growth Rate
1	2	3	4	5	6	7	8
1901-11	252.09	10.29	5.75	0.56	49.20	42.60	6.60
1911-21	251.32	11.18	-0.31	-0.03	48.10	48.60	-0.50
1921-31	278.98	11.99	11.00	1.04	46.40	36.30	10.10
1931-41	318.66	13.86	14.22	1.33	45.20	31.20	14.00
1941-51	361.09	17.29	13.31	1.25	39.90	27.40	12.50
1951-61	439.23	17.97	21.51	1.96	41.70	22.80	18.90
1961-71	548.16	19.91	24.80	2.20	41.20	19.00	22.20
1971-81	683.33	23.34	24.66	2.22	37.20	15.00	22.20
1981-91	844.32	25.72	23.56	2.12	32.50	11.40	21.10

Note:

1. The 1981 Census Population total has been revised in the light of the 1991 results.
2. The 1991 Census figure includes projected population of Jammu & Kashmir.
3. The Vital Rates except for 1981-91 have been calculated from the Census of India data by Reverse Survival Method.
4. Vital Rates for 1981-91 have been calculated using Sample Registration System data.

Table –II**PROJECTED POPULATION OF INDIA - 1996-2016**

YEAR	POPULATION (in '000)		
	MALE	FEMALE	PROJECTED
1996	484859	449360	934219
1997	492571	457307	949878
1998	500359	465249	965608
1999	508174	473150	981324
2000	515984	480961	996945
2001	523780	488606	1012386
2002	531395	496212	1027607
2003	539344	504190	1043534
2004	547556	512468	1060024
2005	555964	520971	1076935
2006	564498	529628	1094126
2007	573068	538378	1111446
2008	581573	546999	1128572
2009	590018	555495	1145513
2010	598407	563876	1162283
2011	606744	572145	1178889
2012	614749	580286	1195035
2013	622966	588608	1211574
2014	631395	597111	1228506
2015	640034	605793	1245827
2016	648886	614657	1263543

Source: Planning Commission, Ninth Five Year Plan, 1997.

Table III**AVERAGE ANNUAL BIRTH AND DEATH RATES IN INDIA**

Decade	Birth per 1000	Death per 1000
1891-1900	45.8	44.4
1901-1910	48.1	42.6
1911-1920	49.2	48.6
1921-1930	46.4	36.3
1931-1940	45.2	31.2
1941-1950	39.9	27.4
1951-1960	40.0	18.0
1961-1970	41.2	19.2
1971-1980	37.2	15.0
1985-1986	32.6	11.1
1996	27.4	8.9

Table IV

**BIRTH AND DEATH RATES (1996)
FOR 14 MAJOR STATES OF INDIA**

State	Birth Rate	Death Rate
1. Kerala	17.8	6.2
2. Tamil Nadu	19.2	7.9
3. Andhra Pradesh	22.7	8.3
4. Maharashtra	23.2	7.4
5. Karnataka	23.0	7.6
6. West Bengal	22.8	7.8
7. Punjab	23.5	7.5
8. Orissa	26.8	10.7
9. Gujarat	25.5	7.6
10. Haryana	28.8	8.1
11. Bihar	32.1	10.2
12. Madhya Pradesh	32.4	11.1
13. Rajasthan	32.3	9.1
14. Uttar Pradesh	34.0	10.2
All India	27.4	8.9

Source: Planning Commission, Ninth Five year Plan (1997-2002)

Table -V

PERCENTAGE POPULATION IN THE AGE GROUP 0 to 14

Year	Male	Female
1971	41.87	42.41
1981	39.60	39.81
1991	37.73	37.79
2001	34.00	34.50
2011	28.40	28.60
2016	27.70	27.70

Source: Government of India, Planning Commissions, Ninth Five-Year Plan (1997-2002)

Table VI

PROJECTED LEVEL OF TFRS FOR MAJOR STATES AND INDIA, 1996-2016

Major States	Period				
	1991	1996-2001	2001-2006	2006-2011	2011-2016
Andhra Pradesh	3.00	2.27	2.03	1.88	1.78
Assam	3.50	2.82	2.55	2.33	2.17
Bihar	4.40	2.92	2.53	3.19	2.93
Gujarat	3.10	2.73	2.48	2.26	2.11
Haryana	4.00	3.25	2.93	2.68	2.47
Karnataka	3.10	2.54	2.31	2.14	2.01
Kerala	1.80	1.62	1.61	1.60	1.60
Madhya Pradesh	4.60	3.99	3.72	3.49	3.27
Maharashtra	3.00	2.51	2.28	2.10	1.97
Orissa	3.30	2.64	2.36	2.16	2.01
Punjab	3.10	2.65	2.43	2.25	2.11
Rajasthan	4.60	3.91	3.58	3.30	3.06
Tamil Nadu	2.20	1.87	1.75	1.69	1.65
Uttar Pradesh	5.10	4.75	4.50	4.27	4.05
West Bengal	3.20	2.56	2.31	2.13	1.99
India (Pooled)	3.64	3.13	2.88	2.68	2.52
India	3.60	3.05	2.75	2.52	2.33

Source: Government of India, Planning Commissions, Ninth five year Plan, 1997.

Table VII

YEAR BY WHICH TFR OF 2.1 WILL BE ACHIEVED

India and Major State	Year for TFR = 2.1	Population of the State (1996) (million)	Percentage of total population
Group I			
Kerala	Achieved in 1988	31.0	3.3
Tamil Nadu	Achieved in 1993	59.6	6.4
Group II			
Andhra Pradesh	2002	72.2	7.7
Maharashtra	2008	86.7	9.3
Karnataka	2009	49.4	5.3
West Bengal	2009	74.7	8.0
Orissa	2020	34.5	3.7
Group III			
Gujarat	2014	45.6	4.9
Assam	2015	24.8	2.6
Group IV			
Punjab	2019	22.4	2.4
Haryana	2025	18.6	2.0
Bihar	2039	93.2	10.0
Rajasthan	2048	49.8	5.3
Madhya Pradesh	Beyond 2060	74.3	8.0
Uttar Pradesh	Beyond 2100	157.0	16.8
Other States	-	40.3	4.3
India	2026	934.2	100.0

Source: Indian Economy by Ruddar Datt and K.P.M. Sundharam,
S. Chand and Company Ltd., New Delhi 110 055, 1999.

Table VIII

**ESTIMATED TOTAL POPULATION AND
ANNUAL AVERAGE GROWTH RATES (1996-2016)**

STATES	As on 1 st March Population in million			Average Annual Growth Rate	
		2006	2016	1996	2006
Kerala	31.0	34.2	36.9	1.0	0.8
Tamil Nadu	59.6	65.6	69.9	0.9	0.7
Andhra Pradesh	72.2	80.6	88.6	1.1	1.0
Maharashtra	86.7	97.3	107.8	1.2	1.0
Karnataka	49.4	56.2	62.8	1.30	1.1
West Bengal	74.7	55.4	96.2	1.35	1.2
Orissa	34.5	37.8	41.0	0.9	0.8
Gujarat	45.6	52.5	59.3	1.4	1.2
Assam	24.8	28.4	32.5	1.35	1.35
Punjab	22.4	25.3	28.0	1.2	1.0
Haryana	8.6	21.8	25.2	1.6	1.45
Bihar	93.2	111.1	132.3	1.75	1.75
Rajasthan	49.8	59.7	71.4	1.83	1.80
Madhya Pradesh	74.3	88.6	105.2	1.77	1.73
Uttar Pradesh	157.0	194.1	242.9	2.1	2.3
Other Smaller States	40.3	44.5	51.2	1.0	1.4
Total	934.2	1,094.1	1,263.5	1.58	1.45

Source: Indian Economy by Ruddar Datt and K.P.M. Sundharam, S. Chand and Company Ltd., New Delhi 110 055, 1999.

Table IX

**POPULATION PROFILE OF 9 STATES AND UNION TERRITORIES OF INDIA
WITH TFR LESS THAN OR EQUAL TO 2.1**

State	Population Size (in millions) as on 1 March 1999	Percent of Total Population	Total Fertility Rate 1997
INDIA	981.3		3.3
Group A (TFR less than or equal to 2.1)			
Goa	1.5	0.2	1.0@
Nagaland	1.6	0.2	1.5@
Delhi	13.4	1.4	1.6@
Kerala	32.0	3.3	1.8
Pondicherry	1.1	0.1	1.8@
A&N Islands	0.4	0.04	1.9@
Tamil Nadu	61.3	6.2	2.0
Chandigarh	0.9	0.09	2.1@
Mizoram	0.9	0.09	NA

@ Three year moving average TFR 1995-97

Table X

POPULATION PROFILE OF 11 STATES AND UNION TERRITORIES OF INDIA

State	Population Size (in millions) as on 1 March 1999	Percent of Total population	Total Fertility Rate 1997
Group B (TFR > 2.1 and < than 3.0)			
Manipur	2.21	0.2	2.4@
Daman & Diu	0.1	0.01	2.5@
Karnataka	51.4	5.2	2.5
Andhra Pradesh	74.6	7.6	2.5
Himachal Pradesh	6.5	0.7	2.5
Sikkim	0.5	0.06	2.5
West Bengal	78.0	7.9	2.6
Maharashtra	90.1	9.2	2.7
Punjab	23.3	2.4	2.7
Arunachal Pradesh	1.2	0.1	2.8@
Lakshadweep	0.07	0.01	2.8@

@ Three year moving average TFR 1995-97

Table XI**POPULATION PROFILE OF 12 STATES AND UNION TERRITORIES OF INDIA WITH TFR GREATER THAN OR EQUAL TO 3.**

State	Population Size (in millions) as on 1 March 1999	Percent of Total Population	Total Fertility Rate 1997
Group C (>3.0)			
Orissa	35.5	3.6	3.0
Gujarat	47.6	4.8	3.0
Assam	25.6	2.6	3.2
Haryana	19.5	2.0	3.4
Dadra & Nagar Haveli	0.2	0.02	3.5@
Tripura	3.6	0.3	3.9
Meghalaya	2.4	0.2	4.8@
Madhya Pradesh	78.3	8.0	4.0
Rajasthan	52.6	5.4	4.2
Bihar	98.1	10.0	4.4
Uttar Pradesh	166.4	17.0	4.8
Jammu & Kashmir	9.7	1.0	NA

@ Three year moving average TFR 1995-97

Table XII**GROWTH OF THE NUMBER OF SCHOOLS**

Category	No. in Thousands	
	1950-51	1996-97
Primary Schools	210	598
Upper Primary Schools	13	177
Secondary and Higher Secondary Schools including Pre-Degree Colleges	NA	102

Table XIII

GROWTH OF POPULATION OF KERALA

Year	Population	Average Annual Growth of rate
1901	63,96,262	0.9
1911	71,47,673	1.2
1921	78,02,127	0.9
1931	95,07,050	2.2
1941	1,10,31,541	1.6
1951	1,35,49,118	2.3
1961	1,69,03,715	2.5
1971	2,13,47,375	2.6
1981	2,54,53,680	1.9
1991	2,90,98,518	1.4

Source: Social Development and Demographic changes in South India by Balakrishnan Nair, V., M.D. Publications Pvt. Ltd., New Delhi, 1994.

Table XIV

DISTRICTWISE DENSITY OF POPULATION, AND RATE OF GROWTH OF POPULATION

S.No.	Name of District	Population in 1991	Density of Population	Annual Rate of Growth
1.	Kasargode	10,71,508	538	2.28
2.	Cannanore	22,51,727	759	1.66
3.	Wyanad	6,72,128	315	2.13
4.	Kozhikode	26,19,941	1118	1.70
5.	Malappuram	30,96,330	872	2.89
6.	Palghat	23,82,235	532	1.65
7.	Trichur	27,37,311	903	1.22
8.	Ernakulam	28,17,236	1170	1.11
9.	Idukkl	10,78,066	215	1.12
10.	Kottayam	18,28,271	830	0.77
11.	Alleppey	20,01,217	1408	0.73
12.	Pathanamthitta	11,88,332	450	0.56
13.	Quilon	24,07,566	967	1.07
14.	Trivandrum	29,46,650	1344	1.35
Kerala		2,90,98,518	749	1.43

Source: Social Development and Demographic changes in South India by Balakrishnan Nair, V., M.D. Publications Pvt. Ltd., New Delhi, 1994.

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